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(54) **Staphylococcus aureus polynucleotides and sequences**

(57) The present invention provides polynucleotide sequences of the genome of *Staphylococcus aureus*, polypeptide sequences encoded by the polynucleotide sequences, corresponding polynucleotides and polypeptides, vectors and hosts comprising the polynu-

cleotides, and assays and other uses thereof. The present invention further provides polynucleotide and polypeptide sequence information stored on computer readable media, and computer-based systems and methods which facilitate its use.

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Description

The present invention relates to the field of molecular biology. In particular, it relates to, among other things, nucleotide sequences of *Staphylococcus aureus*, contigs, ORFs, fragments, probes, primers and related polynucleotides thereof, peptides and polypeptides encoded by the sequences, and uses of the polynucleotides and sequences thereof, such as in fermentation, polypeptide production, assays and pharmaceutical development, among others.

The genus *Staphylococcus* includes at least 20 distinct species. (For a review see Novick, R. P., The *Staphylococcus* as a Molecular Genetic System, Chapter 1, pgs. 1-37 in MOLECULAR BIOLOGY OF THE STAPHYLOCOCCI, R. Novick, Ed., VCH Publishers, New York (1990)). Species differ from one another by 80% or more, by hybridization kinetics, whereas strains within a species are at least 90% identical by the same measure.

The species *Staphylococcus aureus*, a gram-positive, facultatively aerobic, clump-forming cocci, is among the most important etiological agents of bacterial infection in humans, as discussed briefly below.

Human Health and *S. Aureus*

Staphylococcus aureus is a ubiquitous pathogen. (See, for instance, Mims *et al.*, MEDICAL MICROBIOLOGY, Mosby-Year Book Europe Limited, London, UK (1993)). It is an etiological agent of a variety of conditions, ranging in severity from mild to fatal. A few of the more common conditions caused by *S. aureus* infection are burns, cellulitis, eyelid infections, food poisoning, joint infections, neonatal conjunctivitis, osteomyelitis, skin infections, surgical wound infection, scalded skin syndrome and toxic shock syndrome, some of which are described further below.

Burns

Burn wounds generally are sterile initially. However, they generally compromise physical and immune barriers to infection, cause loss of fluid and electrolytes and result in local or general physiological dysfunction. After cooling, contact with viable bacteria results in mixed colonization at the injury site. Infection may be restricted to the non-viable debris on the burn surface ("eschar"), it may progress into full skin infection and invade viable tissue below the eschar and it may reach below the skin, enter the lymphatic and blood circulation and develop into septicaemia. *S. aureus* is among the most important pathogens typically found in burn wound infections. It can destroy granulation tissue and produce severe septicaemia.

Cellulitis

Cellulitis, an acute infection of the skin that expands from a typically superficial origin to spread below the cutaneous layer, most commonly is caused by *S. aureus* in conjunction with *S. pyrogenes*. Cellulitis can lead to systemic infection. In fact, cellulitis can be one aspect of synergistic bacterial gangrene. This condition typically is caused by a mixture of *S. aureus* and microaerophilic streptococci. It causes necrosis and treatment is limited to excision of the necrotic tissue. The condition often is fatal.

Eyelid infections

S. aureus is the cause of styes and of sticky eye" in neonates, among other eye infections. Typically such infections are limited to the surface of the eye, and may occasionally penetrate the surface with more severe consequences.

Food poisoning

Some strains of *S. aureus* produce one or more of five serologically distinct, heat and acid stable enterotoxins that are not destroyed by digestive process of the stomach and small intestine (enterotoxins A-E). Ingestion of the toxin, in sufficient quantities, typically results in severe vomiting, but not diarrhoea. The effect does not require viable bacteria. Although the toxins are known, their mechanism of action is not understood.

Joint infections

S. aureus infects bone joints causing diseases such osteomyelitis.

Osteomyelitis

S. aureus is the most common causative agent of haematogenous osteomyelitis. The disease tends to occur in

children and adolescents more than adults and it is associated with non-penetrating injuries to bones. Infection typically occurs in the long end of growing bone, hence its occurrence in physically immature populations. Most often, infection is localized in the vicinity of sprouting capillary loops adjacent to epiphyseal growth plates in the end of long, growing bones.

Skin infections

S. aureus is the most common pathogen of such minor skin infections as abscesses and boils. Such infections often are resolved by normal host response mechanisms, but they also can develop into severe internal infections. Recurrent infections of the nasal passages plague nasal carriers of *S. aureus*.

Surgical Wound Infections

Surgical wounds often penetrate far into the body. Infection of such wound thus poses a grave risk to the patient. *S. aureus* is the most important causative agent of infections in surgical wounds. *S. aureus* is unusually adept at invading surgical wounds; sutured wounds can be infected by far fewer *S. aureus* cells than are necessary to cause infection in normal skin. Invasion of surgical wound can lead to severe *S. aureus* septicaemia. Invasion of the blood stream by *S. aureus* can lead to seeding and infection of internal organs, particularly heart valves and bone, causing systemic diseases, such as endocarditis and osteomyelitis.

Scalded Skin Syndrome

S. aureus is responsible for "scalded skin syndrome" (also called toxic epidermal necrosis, Ritter's disease and Lyell's disease). This disease occurs in older children, typically in outbreaks caused by flowering of *S. aureus* strains produce exfoliation (also called scalded skin syndrome toxin). Although the bacteria initially may infect only a minor lesion, the toxin destroys intercellular connections, spreads epidermal layers and allows the infection to penetrate the outer layer of the skin, producing the desquamation that typifies the disease. Shedding of the outer layer of skin generally reveals normal skin below, but fluid lost in the process can produce severe injury in young children if it is not treated properly.

Toxic Shock Syndrome

Toxic shock syndrome is caused by strains of *S. aureus* that produce the so-called toxic shock syndrome toxin. The disease can be caused by *S. aureus* infection at any site, but it is too often erroneously viewed exclusively as a disease solely of women who use tampons. The disease involves toxemia and septicaemia, and can be fatal.

Nocosomal Infections

In the 1984 National Nosocomial Infection Surveillance Study ("NNIS") *S. aureus* was the most prevalent agent of surgical wound infections in many hospital services, including medicine, surgery, obstetrics, pediatrics and newborns.

Resistance to drugs of S. aureus strains

Prior to the introduction of penicillin the prognosis for patients seriously infected with *S. aureus* was unfavorable. Following the introduction of penicillin in the early 1940s even the worst *S. aureus* infections generally could be treated successfully. The emergence of penicillin-resistant strains of *S. aureus* did not take long, however. Most strains of *S. aureus* encountered in hospital infections today do not respond to penicillin; although, fortunately, this is not the case for *S. aureus* encountered in community infections.

It is well known now that penicillin-resistant strains of *S. aureus* produce a lactamase which converts penicillin to penicillinoic acid, and thereby destroys antibiotic activity. Furthermore, the lactamase gene often is propagated episomally, typically on a plasmid, and often is only one of several genes on an episomal element that, together, confer multidrug resistance.

Methicillins, introduced in the 1960s, largely overcame the problem of penicillin resistance in *S. aureus*. These compounds conserve the portions of penicillin responsible for antibiotic activity and modify or alter other portions that make penicillin a good substrate for inactivating lactamases. However, methicillin resistance has emerged in *S. aureus*, along with resistance to many other antibiotics effective against this organism, including aminoglycosides, tetracycline, chloramphenicol, macrolides and lincosamides. In fact, methicillin-resistant strains of *S. aureus* generally are multiply drug resistant.

The molecular genetics of most types of drug resistance in *S. aureus* has been elucidated (See Lyon *et al.*, *Microbiology Reviews* 51: 88-134 (1987)). Generally, resistance is mediated by plasmids, as noted above regarding penicillin resistance; however, several stable forms of drug resistance have been observed that apparently involve integration of a resistance element into the *S. aureus* genome itself.

Thus far each new antibiotic gives rise to resistance strains, strains emerge that are resistance to multiple drugs and increasingly persistent forms of resistance begin to emerge. Drug resistance of *S. aureus* infections already poses significant treatment difficulties, which are likely to get much worse unless new therapeutic agents are developed.

Molecular Genetics of *Staphylococcus Aureus*

Despite its importance in, among other things, human disease, relatively little is known about the genome of this organism.

Most genetic studies of *S. aureus* have been carried out using the strain NCTC8325, which contains prophages psi11 psi12 and psi13, and the UV-cured derivative of this strain, 8325-4 (also referred to as RN450), which is free of the prophages.

These studies revealed that the *S. aureus* genome, like that of other *staphylococci*, consists of one circular, covalently closed, double-stranded DNA and a collection of so-called variable accessory genetic elements, such as prophages, plasmids, transposons and the like.

Physical characterization of the genome has not been carried out in any detail. Pattee *et al.* published a low resolution and incomplete genetic and physical map of the chromosome of *S. aureus* strain NCTC 8325. (Pattee *et al.* Genetic and Physical Mapping of Chromosome of *Staphylococcus aureus* NCTC 8325, Chapter 11, pgs. 163-169 in. MOLECULAR BIOLOGY OF THE STAPHYLOCOCCI, R.P. Novick, Ed., VCH Publishers, New York, (1990) The genetic map largely was produced by mapping insertions of Tn551 and Tn4001, which, respectively, confer erythromycin and gentamicin resistance, and by analysis of Smal-digested DNA by Pulsed Field Gel Electrophoresis ("PFGE").

The map was of low resolution; even estimating the physical size of the genome was difficult, according to the investigators. The size of the largest Smal chromosome fragment, for instance, was too large for accurate sizing by PFGE. To estimate its size, additional restriction sites had to be introduced into the chromosome using a transposon containing a Smal recognition sequence.

In sum, most physical characteristics and almost all of the genes of *Staphylococcus aureus* are unknown. Among the few genes that have been identified, most have not been physically mapped or characterized in detail. Only a very few genes of this organism have been sequenced. (See, for instance Thornsberry, J., *Antimicrobial Chemotherapy* 21 Suppl C: 9-16 (1988), current versions of GENBANK and other nucleic acid databases, and references that relate to the genome of *S. aureus* such as those set out elsewhere herein.)

It is clear that the etiology of diseases mediated or exacerbated by *S. aureus* infection involves the programmed expression of *S. aureus* genes, and that characterizing the genes and their patterns of expression would add dramatically to our understanding of the organism and its host interactions. Knowledge of *S. aureus* genes and genomic organization would dramatically improve understanding of disease etiology and lead to improved and new ways of preventing, ameliorating, arresting and reversing diseases. Moreover, characterized genes and genomic fragments of *S. aureus* would provide reagents for, among other things, detecting, characterizing and controlling *S. aureus* infections. There is a need therefore to characterize the genome of *S. aureus* and for polynucleotides and sequences of this organism.

The present invention is based on the sequencing of fragments of the *Staphylococcus aureus* genome. The primary nucleotide sequences which were generated are provided in SEQ ID NOS: 1-5,191.

The present invention provides the nucleotide sequence of several thousand contigs of the *Staphylococcus aureus* genome, which are listed in tables below and set out in the Sequence Listing submitted herewith, and representative fragments thereof, in a form which can be readily used, analyzed, and interpreted by a skilled artisan. In one embodiment, the present invention is provided as contiguous strings of primary sequence information corresponding to the nucleotide sequences depicted in SEQ ID NOS:1-5,191.

The present invention further provides nucleotide sequences which are at least 95%, preferably 99% and most preferably 99.9%, identical to the nucleotide sequences of SEQ ID NOS:1-5,191.

The nucleotide sequence of SEQ ID NOS:1-5,191, a representative fragment thereof, or a nucleotide sequence which is at least 95%, preferably 99% and most preferably 99.9%, identical to the nucleotide sequence of SEQ ID NOS:1-5,191 may be provided in a variety of mediums to facilitate its use. In one application of this embodiment, the sequences of the present invention are recorded on computer readable media. Such media includes, but is not limited to: magnetic storage media, such as floppy discs, hard disc storage medium, and magnetic tape; optical storage media such as CD-ROM; electrical storage media such as RAM and ROM; and hybrids of these categories such as magnetic/optical storage media.

The present invention further provides systems, particularly computer-based systems which contain the sequence

information herein described stored in a data storage means. Such systems are designed to identify commercially important fragments of the *Staphylococcus aureus* genome.

Another embodiment of the present invention is directed to fragments, preferably isolated fragments, of the *Staphylococcus aureus* genome having particular structural or functional attributes. Such fragments of the *Staphylococcus aureus* genome of the present invention include, but are not limited to, fragments which encode peptides, hereinafter referred to as open reading frames or ORFs," fragments which modulate the expression of an operably linked ORF, hereinafter referred to as expression modulating fragments or EMFs," and fragments which can be used to diagnose the presence of *Staphylococcus aureus* in a sample, hereinafter referred to as diagnostic fragments or "DFs."

Each of the ORFs in fragments of the *Staphylococcus aureus* genome disclosed in Tables 1-3, and the EMFs found 5' to the ORFs, can be used in numerous ways as polynucleotide reagents. For instance, the sequences can be used as diagnostic probes or amplification primers for detecting or determining the presence of a specific microbe in a sample, to selectively control gene expression in a host and in the production of polypeptides, such as polypeptides encoded by ORFs of the present invention, particular those polypeptides that have a pharmacological activity.

The present invention further includes recombinant constructs comprising one or more fragments of the *Staphylococcus aureus* genome of the present invention. The recombinant constructs of the present invention comprise vectors, such as a plasmid or viral vector, into which a fragment of the *Staphylococcus aureus* has been inserted.

The present invention further provides host cells containing any of the isolated fragments of the *Staphylococcus aureus* genome of the present invention. The host cells can be a higher eukaryotic host cell, such as a mammalian cell, a lower eukaryotic cell, such as a yeast cell, or a procaryotic cell such as a bacterial cell.

The present invention is further directed to polypeptides and proteins, preferably isolated polypeptides and proteins, encoded by ORFs of the present invention. A variety of methods, well known to those of skill in the art, routinely may be utilized to obtain any of the polypeptides and proteins of the present invention. For instance, polypeptides and proteins of the present invention having relatively short, simple amino acid sequences readily can be synthesized using commercially available automated peptide synthesizers. Polypeptides and proteins of the present invention also may be purified from bacterial cells which naturally produce the protein. Yet another alternative is to purify polypeptide and proteins of the present invention can from cells which have been altered to express them.

The invention further provides polypeptides, preferably isolated polypeptides, comprising *Staphylococcus aureus* epitopes and vaccine compositions comprising such polypeptides. Also provided are methods for vaccinating an individual against *Staphylococcus aureus* infection.

The invention further provides methods of obtaining homologs of the fragments of the *Staphylococcus aureus* genome of the present invention and homologs of the proteins encoded by the ORFs of the present invention. Specifically, by using the nucleotide and amino acid sequences disclosed herein as a probe or as primers, and techniques such as PCR cloning and colony/plaque hybridization, one skilled in the art can obtain homologs.

The invention further provides antibodies which selectively bind polypeptides and proteins of the present invention. Such antibodies include both monoclonal and polyclonal antibodies.

The invention further provides hybridomas which produce the above-described antibodies. A hybridoma is an immortalized cell line which is capable of secreting a specific monoclonal antibody.

The present invention further provides methods of identifying test samples derived from cells which express one of the ORFs of the present invention, or a homolog thereof. Such methods comprise incubating a test sample with one or more of the antibodies of the present invention, or one or more of the DFs or antigens of the present invention, under conditions which allow a skilled artisan to determine if the sample contains the ORF or product produced therefrom.

In another embodiment of the present invention, kits are provided which contain the necessary reagents to carry out the above-described assays.

Specifically, the invention provides a compartmentalized kit to receive, in close confinement, one or more containers which comprises: (a) a first container comprising one of the antibodies, antigens, or one of the DFs of the present invention; and (b) one or more other containers comprising one or more of the following: wash reagents, reagents capable of detecting presence of bound antibodies, antigens or hybridized DFs.

Using the isolated proteins of the present invention, the present invention further provides methods of obtaining and identifying agents capable of binding to a polypeptide or protein encoded by one of the ORFs of the present invention. Specifically, such agents include, as further described below, antibodies, peptides, carbohydrates, pharmaceutical agents and the like. Such methods comprise steps of: (a) contacting an agent with an isolated protein encoded by one of the ORFs of the present invention; and (b) determining whether the agent binds to said protein.

The present genomic sequences of *Staphylococcus aureus* will be of great value to all laboratories working with this organism and for a variety of commercial purposes. Many fragments of the *Staphylococcus aureus* genome will be immediately identified by similarity searches against GenBank or protein databases and will be of immediate value to *Staphylococcus aureus* researchers and for immediate commercial value for the production of proteins or to control gene expression.

The methodology and technology for elucidating extensive genomic sequences of bacterial and other genomes

has and will greatly enhance the ability to analyze and understand chromosomal organization. In particular, sequenced contigs and genomes will provide the models for developing tools for the analysis of chromosome structure and function, including the ability to identify genes within large segments of genomic DNA, the structure, position, and spacing of regulatory elements, the identification of genes with potential industrial applications, and the ability to do comparative genomic and molecular phylogeny.

FIGURE 1 is a block diagram of a computer system (102) that can be used to implement computer-based systems of present invention.

FIGURE 2 is a schematic diagram depicting the data flow and computer programs used to collect, assemble, edit and annotate the contigs of the *Staphylococcus aureus* genome of the present invention. Both Macintosh and Unix platforms are used to handle the AB 373 and 377 sequence data files, largely as described in Kerlavage *et al.*, *Proceedings of the Twenty-Sixth Annual Hawaii International Conference on System Sciences*, 585, IEEE Computer Society Press, Washington D.C. (1993). Factura (AB) is a Macintosh program designed for automatic vector sequence removal and end-trimming of sequence files. The program Loadis runs on a Macintosh platform and parses the feature data extracted from the sequence files by Factura to the Unix based *Staphylococcus aureus* relational database. Assembly of contigs (and whole genome sequences) is accomplished by retrieving a specific set of sequence files and their associated features using extrseq, a Unix utility for retrieving sequences from an SQL database. The resulting sequence file is processed by seq_filter to trim portions of the sequences with more than 2% ambiguous nucleotides. The sequence files were assembled using TIGR Assembler, an assembly engine designed at The Institute for Genomic Research (TIGR) for rapid and accurate assembly of thousands of sequence fragments. The collection of contigs generated by the assembly step is loaded into the database with the lassie program. Identification of open reading frames (ORFs) is accomplished by processing contigs with zorf. The ORFs are searched against *S. aureus* sequences from Genbank and against all protein sequences using the BLASTN and BLASTP programs, described in Altschul *et al.*, *J. Mol. Biol.* 215: 403-410 (1990). Results of the ORF determination and similarity searching steps were loaded into the database. As described below, some results of the determination and the searches are set out in Tables 1-3.

The present invention is based on the sequencing of fragments of the *Staphylococcus aureus* genome and analysis of the sequences. The primary nucleotide sequences generated by sequencing the fragments are provided in SEQ ID NOS:1-5,191. (As used herein, the "primary sequence" refers to the nucleotide sequence represented by the IUPAC nomenclature system.)

In addition to the aforementioned *Staphylococcus aureus* polynucleotide and polynucleotide sequences, the present invention provides the nucleotide sequences of SEQ ID NOS:1-5,191, or representative fragments thereof, in a form which can be readily used, analyzed, and interpreted by a skilled artisan.

As used herein, a "representative fragment of the nucleotide sequence depicted in SEQ ID NOS:1-5,191" refers to any portion of the SEQ ID NOS:1-5,191 which is not presently represented within a publicly available database. Preferred representative fragments of the present invention are *Staphylococcus aureus* open reading frames (ORFs), expression modulating fragment (EMFs) and fragments which can be used to diagnose the presence of *Staphylococcus aureus* in sample ("DFs"). A non-limiting identification of preferred representative fragments is provided in Tables 1-3.

As discussed in detail below, the information provided in SEQ ID NOS:1-5,191 and in Tables 1-3 together with routine cloning, synthesis, sequencing and assay methods will enable those skilled in the art to clone and sequence all "representative fragments" of interest, including open reading frames encoding a large variety of *Staphylococcus aureus* proteins.

While the presently disclosed sequences of SEQ ID NOS:1-5,191 are highly accurate, sequencing techniques are not perfect and, in relatively rare instances, further investigation of a fragment or sequence of the invention may reveal a nucleotide sequence error present in a nucleotide sequence disclosed in SEQ ID NOS:1-5,191. However, once the present invention is made available (*i.e.*, once the information in SEQ ID NOS:1-5,191 and Tables 1-3 has been made available), resolving a rare sequencing error in SEQ ID NOS:1-5,191 will be well within the skill of the art. The present disclosure makes available sufficient sequence information to allow any of the described contigs or portions thereof to be obtained readily by straightforward application of routine techniques. Further sequencing of such polynucleotide may proceed in like manner using manual and automated sequencing methods which are employed ubiquitous in the art. Nucleotide sequence editing software is publicly available. For example, Applied Biosystem's (AB) AutoAssembler can be used as an aid during visual inspection of nucleotide sequences. By employing such routine techniques potential errors readily may be identified and the correct sequence then may be ascertained by targeting further sequencing effort, also of a routine nature, to the region containing the potential error.

Even if all of the very rare sequencing errors in SEQ ID NOS:1-5,191 were corrected, the resulting nucleotide sequences would still be at least 95% identical, nearly all would be at least 99% identical, and the great majority would be at least 99.9% identical to the nucleotide sequences of SEQ ID NOS:1-5,191.

As discussed elsewhere herein, polynucleotides of the present invention readily may be obtained by routine application of well known and standard procedures for cloning and sequencing DNA. Detailed methods for obtaining

libraries and for sequencing are provided below, for instance. A wide variety of *Staphylococcus aureus* strains that can be used to prepare *S. aureus* genomic DNA for cloning and for obtaining polynucleotides of the present invention are available to the public from recognized depository institutions, such as the American Type Culture Collection (ATCC®).

5 The nucleotide sequences of the genomes from different strains of *Staphylococcus aureus* differ somewhat. However, the nucleotide sequences of the genomes of all *Staphylococcus aureus* strains will be at least 95% identical, in corresponding part, to the nucleotide sequences provided in SEQ ID NOS:1-5,191. Nearly all will be at least 99% identical and the great majority will be 99.9% identical.

Thus, the present invention further provides nucleotide sequences which are at least 95%, preferably 99% and most preferably 99.9% identical to the nucleotide sequences of SEQ ID NOS:1-5,191, in a form which can be readily
10 used, analyzed and interpreted by the skilled artisan.

Methods for determining whether a nucleotide sequence is at least 95%, at least 99% or at least 99.9% identical to the nucleotide sequences of SEQ ID NOS:1-5,191 are routine and readily available to the skilled artisan. For example, the well known fasta algorithm described in Pearson and Lipman, *Proc. Natl. Acad. Sci. USA* 85: 2444 (1988) can be used to generate the percent identity of nucleotide sequences. The BLASTN program also can be used to generate
15 an identity score of polynucleotides compared to one another.

COMPUTER RELATED EMBODIMENTS

The nucleotide sequences provided in SEQ ID NOS:1-5,191, a representative fragment thereof, or a nucleotide
20 sequence at least 95%, preferably at least 99% and most preferably at least 99.9% identical to a polynucleotide sequence of SEQ ID NOS:1-5,191 may be "provided" in a variety of mediums to facilitate use thereof. As used herein, "provided" refers to a manufacture, other than an isolated nucleic acid molecule, which contains a nucleotide sequence of the present invention; i.e., a nucleotide sequence provided in SEQ ID NOS:1-5,191, a representative fragment thereof, or a nucleotide sequence at least 95%, preferably at least 99% and most preferably at least 99.9% identical
25 to a polynucleotide of SEQ ID NOS:1-5,191. Such a manufacture provides a large portion of the *Staphylococcus aureus* genome and parts thereof (e.g., a *Staphylococcus aureus* open reading frame (ORF)) in a form which allows a skilled artisan to examine the manufacture using means not directly applicable to examining the *Staphylococcus aureus* genome or a subset thereof as it exists in nature or in purified form.

In one application of this embodiment, a nucleotide sequence of the present invention can be recorded on computer
30 readable media. As used herein, "computer readable media" refers to any medium which can be read and accessed directly by a computer. Such media include, but are not limited to: magnetic storage media, such as floppy discs, hard disc storage medium, and magnetic tape; optical storage media such as CD-ROM; electrical storage media such as RAM and ROM; and hybrids of these categories, such as magnetic/optical storage media. A skilled artisan can readily appreciate how any of the presently known computer readable mediums can be used to create a manufacture comprising computer readable medium having recorded thereon a nucleotide sequence of the present invention. Likewise,
35 it will be clear to those of skill how additional computer readable media that may be developed also can be used to create analogous manufactures having recorded thereon a nucleotide sequence of the present invention.

As used herein, "recorded" refers to a process for storing information on computer readable medium. A skilled
40 artisan can readily adopt any of the presently known methods for recording information on computer readable medium to generate manufactures comprising the nucleotide sequence information of the present invention.

A variety of data storage structures are available to a skilled artisan for creating a computer readable medium having recorded thereon a nucleotide sequence of the present invention. The choice of the data storage structure will generally be based on the means chosen to access the stored information. In addition, a variety of data processor
45 programs and formats can be used to store the nucleotide sequence information of the present invention on computer readable medium. The sequence information can be represented in a word processing text file, formatted in commercially-available software such as WordPerfect and Microsoft Word, or represented in the form of an ASCII file, stored in a database application, such as DB2, Sybase, Oracle, or the like. A skilled artisan can readily adapt any number of data-processor structuring formats (e.g., text file or database) in order to obtain computer readable medium having recorded thereon the nucleotide sequence information of the present invention.

50 Computer software is publicly available which allows a skilled artisan to access sequence information provided in a computer readable medium. Thus, by providing in computer readable form the nucleotide sequences of SEQ ID NOS:1-5,191, a representative fragment thereof, or a nucleotide sequence at least 95%, preferably at least 99% and most preferably at least 99.9% identical to a sequence of SEQ ID NOS:1-5,191 the present invention enables the skilled artisan routinely to access the provided sequence information for a wide variety of purposes.

55 The examples which follow demonstrate how software which implements the BLAST (Altschul *et al.*, *J. Mol. Biol.* 215:403-410 (1990)) and BLAZE (Brutlag *et al.*, *Comp. Chem.* 17:203-207 (1993)) search algorithms on a Sybase system was used to identify open reading frames (ORFs) within the *Staphylococcus aureus* genome which contain homology to ORFs or proteins from both *Staphylococcus aureus* and from other organisms. Among the ORFs discussed

herein are protein encoding fragments of the *Staphylococcus aureus* genome useful in producing commercially important proteins, such as enzymes used in fermentation reactions and in the production of commercially useful metabolites.

The present invention further provides systems, particularly computer-based systems, which contain the sequence information described herein. Such systems are designed to identify, among other things, commercially important fragments of the *Staphylococcus aureus* genome.

As used herein, "a computer-based system" refers to the hardware means, software means, and data storage means used to analyze the nucleotide sequence information of the present invention. The minimum hardware means of the computer-based systems of the present invention comprises a central processing unit (CPU), input means, output means, and data storage means. A skilled artisan can readily appreciate that any one of the currently available computer-based system are suitable for use in the present invention.

As stated above, the computer-based systems of the present invention comprise a data storage means having stored therein a nucleotide sequence of the present invention and the necessary hardware means and software means for supporting and implementing a search means.

As used herein, "data storage means" refers to memory which can store nucleotide sequence information of the present invention, or a memory access means which can access manufactures having recorded thereon the nucleotide sequence information of the present invention.

As used herein, "search means" refers to one or more programs which are implemented on the computer-based system to compare a target sequence or target structural motif with the sequence information stored within the data storage means. Search means are used to identify fragments or regions of the present genomic sequences which match a particular target sequence or target motif. A variety of known algorithms are disclosed publicly and a variety of commercially available software for conducting search means are and can be used in the computer-based systems of the present invention. Examples of such software includes, but is not limited to, MacPattern (EMBL), BLASTN and BLASTX (NCBIA). A skilled artisan can readily recognize that any one of the available algorithms or implementing software packages for conducting homology searches can be adapted for use in the present computer-based systems.

As used herein, a "target sequence" can be any DNA or amino acid sequence of six or more nucleotides or two or more amino acids. A skilled artisan can readily recognize that the longer a target sequence is, the less likely a target sequence will be present as a random occurrence in the database. The most preferred sequence length of a target sequence is from about 10 to 100 amino acids or from about 30 to 300 nucleotide residues. However, it is well recognized that searches for commercially important fragments, such as sequence fragments involved in gene expression and protein processing, may be of shorter length.

As used herein, "a target structural motif," or "target motif," refers to any rationally selected sequence or combination of sequences in which the sequence(s) are chosen based on a three-dimensional configuration which is formed upon the folding of the target motif. There are a variety of target motifs known in the art. Protein target motifs include, but are not limited to, enzymic active sites and signal sequences. Nucleic acid target motifs include, but are not limited to, promoter sequences, hairpin structures and inducible expression elements (protein binding sequences).

A variety of structural formats for the input and output means can be used to input and output the information in the computer-based systems of the present invention. A preferred format for an output means ranks fragments of the *Staphylococcus aureus* genomic sequences possessing varying degrees of homology to the target sequence or target motif. Such presentation provides a skilled artisan with a ranking of sequences which contain various amounts of the target sequence or target motif and identifies the degree of homology contained in the identified fragment.

A variety of comparing means can be used to compare a target sequence or target motif with the data storage means to identify sequence fragments of the *Staphylococcus aureus* genome. In the present examples, implementing software which implement the BLAST and BLAZE algorithms, described in Altschul *et al.*, *J. Mol. Biol.* 215: 403-410 (1990), was used to identify open reading frames within the *Staphylococcus aureus* genome. A skilled artisan can readily recognize that any one of the publicly available homology search programs can be used as the search means for the computer-based systems of the present invention. Of course, suitable proprietary systems that may be known to those of skill also may be employed in this regard.

Figure 1 provides a block diagram of a computer system illustrative of embodiments of this aspect of present invention. The computer system 102 includes a processor 106 connected to a bus 104. Also connected to the bus 104 are a main memory 108 (preferably implemented as random access memory, RAM) and a variety of secondary storage devices 110, such as a hard drive 112 and a removable medium storage device 114. The removable medium storage device 114 may represent, for example, a floppy disk drive, a CD-ROM drive, a magnetic tape drive, *etc.* A removable storage medium 116 (such as a floppy disk, a compact disk, a magnetic tape, *etc.*) containing control logic and/or data recorded therein may be inserted into the removable medium storage device 114. The computer system 102 includes appropriate software for reading the control logic and/or the data from the removable medium storage device 114, once it is inserted into the removable medium storage device 114.

A nucleotide sequence of the present invention may be stored in a well known manner in the main memory 108, any of the secondary storage devices 110, and/or a removable storage medium 116. During execution, software for

accessing and processing the genomic sequence (such as search tools, comparing tools, etc.) reside in main memory 108, in accordance with the requirements and operating parameters of the operating system, the hardware system and the software program or programs.

BIOCHEMICAL EMBODIMENTS

Other embodiments of the present invention are directed to fragments of the *Staphylococcus aureus* genome, preferably to isolated fragments. The fragments of the *Staphylococcus aureus* genome of the present invention include, but are not limited to fragments which encode peptides, hereinafter open reading frames (ORFs), fragments which modulate the expression of an operably linked ORF, hereinafter expression modulating fragments (EMFs) and fragments which can be used to diagnose the presence of *Staphylococcus aureus* in a sample, hereinafter diagnostic fragments (DFs).

As used herein, an "isolated nucleic acid molecule" or an "isolated fragment of the *Staphylococcus aureus* genome" refers to a nucleic acid molecule possessing a specific nucleotide sequence which has been subjected to purification means to reduce, from the composition, the number of compounds which are normally associated with the composition. Particularly, the term refers to the nucleic acid molecules having the sequences set out in SEQ ID NOS:1-5,191, to representative fragments thereof as described above, to polynucleotides at least 95%, preferably at least 99% and especially preferably at least 99.9% identical in sequence thereto, also as set out above.

A variety of purification means can be used to generate the isolated fragments of the present invention. These include, but are not limited to methods which separate constituents of a solution based on charge, solubility, or size.

In one embodiment, *Staphylococcus aureus* DNA can be mechanically sheared to produce fragments of 15-20 kb in length. These fragments can then be used to generate an *Staphylococcus aureus* library by inserting them into lambda clones as described in the Examples below. Primers flanking, for example, an ORF, such as those enumerated in Tables 1-3 can then be generated using nucleotide sequence information provided in SEQ ID NOS: 1-5,191. Well known and routine techniques of PCR cloning then can be used to isolate the ORF from the lambda DNA library of *Staphylococcus aureus* genomic DNA. Thus, given the availability of SEQ ID NOS:1-5,191, the information in Tables 1, 2 and 3, and the information that may be obtained readily by analysis of the sequences of SEQ ID NOS:1-5,191 using methods set out above, those of skill will be enabled by the present disclosure to isolate any ORF-containing or other nucleic acid fragment of the present invention.

The isolated nucleic acid molecules of the present invention include, but are not limited to single stranded and double stranded DNA, and single stranded RNA.

As used herein, an "open reading frame," ORF, means a series of triplets coding for amino acids without any termination codons and is a sequence translatable into protein.

Tables 1, 2 and 3 list ORFs in the *Staphylococcus aureus* genomic contigs of the present invention that were identified as putative coding regions by the GeneMark software using organism-specific second-order Markov probability transition matrices. It will be appreciated that other criteria can be used, in accordance with well known analytical methods, such as those discussed herein, to generate more inclusive, more restrictive or more selective lists.

Table 1 sets out ORFs in the *Staphylococcus aureus* contigs of the present invention that are at least 80 amino acids long and over a continuous region of at least 50 bases which are 95% or more identical (by BLAST analysis) to an *S. aureus* nucleotide sequence available through Genbank in November 1996.

Table 2 sets out ORFs in the *Staphylococcus aureus* contigs of the present invention that are not in Table 1 and match, with a BLASTP probability score of 0.01 or less, a polypeptide sequence available through Genbank by September 1996.

Table 3 sets out ORFs in the *Staphylococcus aureus* contigs of the present invention that do not match significantly, by BLASTP analysis, a polypeptide sequence available through Genbank by September 1996.

In each table, the first and second columns identify the ORF by, respectively, contig number and ORF number within the contig; the third column indicates the reading frame, taking the first 5' nucleotide of the contig as the start of the +1 frame; the fourth column indicates the first nucleotide of the ORF, counting from the 5' end of the contig strand; and the fifth column indicates the length of each ORF in nucleotides.

In Tables 1 and 2, column six, lists the "Reference" for the closest matching sequence available through Genbank. These reference numbers are the databases entry numbers commonly used by those of skill in the art, who will be familiar with their denominators. Descriptions of the nomenclature are available from the National Center for Biotechnology Information. Column seven in Tables 1 and 2 provides the "gene name" of the matching sequence; column eight provides the BLAST identity score from the comparison of the ORF and the homologous gene; and column nine indicates the length in nucleotides of the highest scoring segment pair identified by the BLAST identity analysis.

In Table 3, the last column, column six, indicates the length of each ORF in amino acid residues.

The concepts of percent identity and percent similarity of two polypeptide sequences is well understood in the art. For example, two polypeptides 10 amino acids in length which differ at three amino acid positions (e.g., at positions

1, 3 and 5) are said to have a percent identity of 70%. However, the same two polypeptides would be deemed to have a percent similarity of 80% if, for example at position 5, the amino acids moieties, although not identical, were "similar" (i.e., possessed similar biochemical characteristics). Many programs for analysis of nucleotide or amino acid sequence similarity, such as fasta and BLAST specifically list per cent identity of a matching region as an output parameter. Thus, for instance, Tables 1 and 2 herein enumerate the per cent identity* of the highest scoring segment pair* in each ORF and its listed relative. Further details concerning the algorithms and criteria used for homology searches are provided below and are described in the pertinent literature highlighted by the citations provided below.

It will be appreciated that other criteria can be used to generate more inclusive and more exclusive listings of the types set out in the tables. As those of skill will appreciate, narrow and broad searches both are useful. Thus, a skilled artisan can readily identify ORFs in contigs of the *Staphylococcus aureus* genome other than those listed in Tables 1-3, such as ORFs which are overlapping or encoded by the opposite strand of an identified ORF in addition to those ascertainable using the computer-based systems of the present invention.

As used herein, an "expression modulating fragment," EMF, means a series of nucleotide molecules which modulates the expression of an operably linked ORF or EMF.

As used herein, a sequence is said to "modulate the expression of an operably linked sequence" when the expression of the sequence is altered by the presence of the EMF. EMFs include, but are not limited to, promoters, and promoter modulating sequences (inducible elements). One class of EMFs are fragments which induce the expression or an operably linked ORF in response to a specific regulatory factor or physiological event.

EMF sequences can be identified within the contigs of the *Staphylococcus aureus* genome by their proximity to the ORFs provided in Tables 1-3. An intergenic segment, or a fragment of the intergenic segment, from about 10 to 200 nucleotides in length, taken from any one of the ORFs of Tables 1-3 will modulate the expression of an operably linked ORF in a fashion similar to that found with the naturally linked ORF sequence. As used herein, an "intergenic segment" refers to fragments of the *Staphylococcus aureus* genome which are between two ORF(s) herein described. EMFs also can be identified using known EMFs as a target sequence or target motif in the computer-based systems of the present invention. Further, the two methods can be combined and used together.

The presence and activity of an EMF can be confirmed using an EMF trap vector. An EMF trap vector contains a cloning site linked to a marker sequence. A marker sequence encodes an identifiable phenotype, such as antibiotic resistance or a complementing nutrition auxotrophic factor, which can be identified or assayed when the EMF trap vector is placed within an appropriate host under appropriate conditions. As described above, a EMF will modulate the expression of an operably linked marker sequence. A more detailed discussion of various marker sequences is provided below.

A sequence which is suspected as being an EMF is cloned in all three reading frames in one or more restriction sites upstream from the marker sequence in the EMF trap vector. The vector is then transformed into an appropriate host using known procedures and the phenotype of the transformed host is examined under appropriate conditions. As described above, an EMF will modulate the expression of an operably linked marker sequence.

As used herein, a "diagnostic fragment," DF, means a series of nucleotide molecules which selectively hybridize to *Staphylococcus aureus* sequences. DFs can be readily identified by identifying unique sequences within contigs of the *Staphylococcus aureus* genome, such as by using well-known computer analysis software, and by generating and testing probes or amplification primers consisting of the DF sequence in an appropriate diagnostic format which determines amplification or hybridization selectivity.

The sequences falling within the scope of the present invention are not limited to the specific sequences herein described, but also include allelic and species variations thereof. Allelic and species variations can be routinely determined by comparing the sequences provided in SEQ ID NOS:1-5,191, a representative fragment thereof, or a nucleotide sequence at least 95%, preferably 99% and most preferably 99.9% identical to SEQ ID NOS:1-5,191, with a sequence from another isolate of the same species.

Furthermore, to accommodate codon variability, the invention includes nucleic acid molecules coding for the same amino acid sequences as do the nucleic acid sequences mentioned above. In other words, in the coding region of an ORF, substitution of one codon for another which encodes the same amino acid is expressly contemplated.

Any specific sequence disclosed herein can be readily screened for errors by resequencing a particular fragment, such as an ORF, in both directions (i.e., sequence both strands). Alternatively, error screening can be performed by sequencing corresponding polynucleotides of *Staphylococcus aureus* origin isolated by using part or all of the fragments in question as a probe or primer.

Each of the ORFs of the *Staphylococcus aureus* genome disclosed in Tables 1, 2 and 3, and the EMFs found 5' to the ORFs, can be used as polynucleotide reagents in numerous ways. For example, the sequences can be used as diagnostic probes or diagnostic amplification primers to detect the presence of a specific microbe in a sample, particular *Staphylococcus aureus*. Especially preferred in this regard are ORF such as those of Table 3, which do not match previously characterized sequences from other organisms and thus are most likely to be highly selective for *Staphylococcus aureus*. Also particularly preferred are ORFs that can be used to distinguish between strains of *Staphylococcus aureus*.

phylococcus aureus, particularly those that distinguish medically important strain, such as drug-resistant strains.

In addition, the fragments of the present invention, as broadly described, can be used to control gene expression through triple helix formation or antisense DNA or RNA, both of which methods are based on the binding of a polynucleotide sequence to DNA or RNA. Triple helix-formation optimally results in a shut-off of RNA transcription from DNA, while antisense RNA hybridization blocks translation of an mRNA molecule into polypeptide. Information from the sequences of the present invention can be used to design antisense and triple helix-forming oligonucleotides. Polynucleotides suitable for use in these methods are usually 20 to 40 bases in length and are designed to be complementary to a region of the gene involved in transcription, for triple-helix formation, or to the mRNA itself, for antisense inhibition. Both techniques have been demonstrated to be effective in model systems, and the requisite techniques are well known and involve routine procedures. Triple helix techniques are discussed in, for example, Lee *et al.*, *Nucl. Acids Res.* **6**: 3073 (1979); Cooney *et al.*, *Science* **241**: 456 (1988); and Dervan *et al.*, *Science* **251**: 1360 (1991). Antisense techniques in general are discussed in, for instance, Okano, *J. Neurochem.* **56**: 560 (1991) and OLIGODEOXYNUCLEOTIDES AS ANTISENSE INHIBITORS OF GENE EXPRESSION, CRC Press, Boca Raton, FL (1988).

The present invention further provides recombinant constructs comprising one or more fragments of the *Staphylococcus aureus* genomic fragments and contigs of the present invention. Certain preferred recombinant constructs of the present invention comprise a vector, such as a plasmid or viral vector, into which a fragment of the *Staphylococcus aureus* genome has been inserted, in a forward or reverse orientation. In the case of a vector comprising one of the ORFs of the present invention, the vector may further comprise regulatory sequences, including for example, a promoter, operably linked to the ORF. For vectors comprising the EMFs of the present invention, the vector may further comprise a marker sequence or heterologous ORF operably linked to the EMF.

Large numbers of suitable vectors and promoters are known to those of skill in the art and are commercially available for generating the recombinant constructs of the present invention. The following vectors are provided by way of example. Useful bacterial vectors include phagescript, PsiX174, pBluescript SK and KS (+ and -), pNH8a, pNH16a, pNH18a, pNH46a (available from Stratagene); pTrc99A, pKK223-3, pKK233-3, pDR540, pRIT5 (available from Pharmacia). Useful eukaryotic vectors include pWLneo, pSV2cat, pOG44, pXT1, pSG (available from Stratagene) pSVK3, pBPV, pMSG, pSVL (available from Pharmacia).

Promoter regions can be selected from any desired gene using CAT (chloramphenicol transferase) vectors or other vectors with selectable markers. Two appropriate vectors are pKK232-8 and pCM7. Particular named bacterial promoters include lacI, lacZ, T3, T7, gpt, lambda-PR, and trc. Eukaryotic promoters include CMV immediate early, HSV thymidine kinase, early and late SV40, LTRs from retrovirus, and mouse metallothionein-I. Selection of the appropriate vector and promoter is well within the level of ordinary skill in the art.

The present invention further provides host cells containing any one of the isolated fragments of the *Staphylococcus aureus* genomic fragments and contigs of the present invention, wherein the fragment has been introduced into the host cell using known methods. The host cell can be a higher eukaryotic host cell, such as a mammalian cell, a lower eukaryotic host cell, such as a yeast cell, or a procaryotic cell, such as a bacterial cell.

A polynucleotide of the present invention, such as a recombinant construct comprising an ORF of the present invention, may be introduced into the host by a variety of well established techniques that are standard in the art, such as calcium phosphate transfection, DEAE, dextran mediated transfection and electroporation, which are described in, for instance, Davis, L. *et al.*, BASIC METHODS IN MOLECULAR BIOLOGY (1986).

A host cell containing one of the fragments of the *Staphylococcus aureus* genomic fragments and contigs of the present invention, can be used in conventional manners to produce the gene product encoded by the isolated fragment (in the case of an ORF) or can be used to produce a heterologous protein under the control of the EMF.

The present invention further provides isolated polypeptides encoded by the nucleic acid fragments of the present invention or by degenerate variants of the nucleic acid fragments of the present invention. By "degenerate variant" is intended nucleotide fragments which differ from a nucleic acid fragment of the present invention (e.g., an ORF) by nucleotide sequence but, due to the degeneracy of the Genetic Code, encode an identical polypeptide sequence.

Preferred nucleic acid fragments of the present invention are the ORFs depicted in Tables 2 and 3 which encode proteins.

A variety of methodologies known in the art can be utilized to obtain any one of the isolated polypeptides or proteins of the present invention. At the simplest level, the amino acid sequence can be synthesized using commercially available peptide synthesizers. This is particularly useful in producing small peptides and fragments of larger polypeptides. Such short fragments as may be obtained most readily by synthesis are useful, for example, in generating antibodies against the native polypeptide, as discussed further below.

In an alternative method, the polypeptide or protein is purified from bacterial cells which naturally produce the polypeptide or protein. One skilled in the art can readily employ well-known methods for isolating polypeptides and proteins to isolate and purify polypeptides or proteins of the present invention produced naturally by a bacterial strain, or by other methods. Methods for isolation and purification that can be employed in this regard include, but are not limited to, immunochromatography, HPLC, size-exclusion chromatography, ion-exchange chromatography, and immu-

no-affinity chromatography.

The polypeptides and proteins of the present invention also can be purified from cells which have been altered to express the desired polypeptide or protein. As used herein, a cell is said to be altered to express a desired polypeptide or protein when the cell, through genetic manipulation, is made to produce a polypeptide or protein which it normally does not produce or which the cell normally produces at a lower level. Those skilled in the art can readily adapt procedures for introducing and expressing either recombinant or synthetic sequences into eukaryotic or prokaryotic cells in order to generate a cell which produces one of the polypeptides or proteins of the present invention.

Any host/vector system can be used to express one or more of the ORFs of the present invention. These include, but are not limited to, eukaryotic hosts such as HeLa cells, CV-1 cell, COS cells, and Sf9 cells, as well as prokaryotic host such as *E. coli* and *B. subtilis*. The most preferred cells are those which do not normally express the particular polypeptide or protein or which expresses the polypeptide or protein at low natural level.

"Recombinant," as used herein, means that a polypeptide or protein is derived from recombinant (e.g., microbial or mammalian) expression systems. "Microbial" refers to recombinant polypeptides or proteins made in bacterial or fungal (e.g., yeast) expression systems. As a product, "recombinant microbial" defines a polypeptide or protein essentially free of native endogenous substances and unaccompanied by associated native glycosylation. Polypeptides or proteins expressed in most bacterial cultures, e.g., *E. coli*, will be free of glycosylation modifications; polypeptides or proteins expressed in yeast will have a glycosylation pattern different from that expressed in mammalian cells.

"Nucleotide sequence" refers to a heteropolymer of deoxyribonucleotides. Generally, DNA segments encoding the polypeptides and proteins provided by this invention are assembled from fragments of the *Staphylococcus aureus* genome and short oligonucleotide linkers, or from a series of oligonucleotides, to provide a synthetic gene which is capable of being expressed in a recombinant transcriptional unit comprising regulatory elements derived from a microbial or viral operon.

"Recombinant expression vehicle or vector" refers to a plasmid or phage or virus or vector, for expressing a polypeptide from a DNA (RNA) sequence. The expression vehicle can comprise a transcriptional unit comprising an assembly of (1) a genetic regulatory elements necessary for gene expression in the host, including elements required to initiate and maintain transcription at a level sufficient for suitable expression of the desired polypeptide, including, for example, promoters and, where necessary, an enhancers and a polyadenylation signal; (2) a structural or coding sequence which is transcribed into mRNA and translated into protein, and (3) appropriate signals to initiate translation at the beginning of the desired coding region and terminate translation at its end. Structural units intended for use in yeast or eukaryotic expression systems preferably include a leader sequence enabling extracellular secretion of translated protein by a host cell. Alternatively, where recombinant protein is expressed without a leader or transport sequence, it may include an N-terminal methionine residue. This residue may or may not be subsequently cleaved from the expressed recombinant protein to provide a final product.

"Recombinant expression system" means host cells which have stably integrated a recombinant transcriptional unit into chromosomal DNA or carry the recombinant transcriptional unit extra chromosomally. The cells can be prokaryotic or eukaryotic. Recombinant expression systems as defined herein will express heterologous polypeptides or proteins upon induction of the regulatory elements linked to the DNA segment or synthetic gene to be expressed.

Mature proteins can be expressed in mammalian cells, yeast, bacteria, or other cells under the control of appropriate promoters. Cell-free translation systems can also be employed to produce such proteins using RNAs derived from the DNA constructs of the present invention. Appropriate cloning and expression vectors for use with prokaryotic and eukaryotic hosts are described in Sambrook *et al.*, MOLECULAR CLONING: A LABORATORY MANUAL, 2nd Edition, Cold Spring Harbor Laboratory Press, Cold Spring Harbor, New York (1989), the disclosure of which is hereby incorporated by reference in its entirety.

Generally, recombinant expression vectors will include origins of replication and selectable markers permitting transformation of the host cell, e.g., the ampicillin resistance gene of *E. coli* and *S. cerevisiae* TRP1 gene, and a promoter derived from a highly expressed gene to direct transcription of a downstream structural sequence. Such promoters can be derived from operons encoding glycolytic enzymes such as 3-phosphoglycerate kinase (PGK), alpha-factor, acid phosphatase, or heat shock proteins, among others. The heterologous structural sequence is assembled in appropriate phase with translation initiation and termination sequences, and preferably, a leader sequence capable of directing secretion of translated protein into the periplasmic space or extracellular medium. Optionally, the heterologous sequence can encode a fusion protein including an N-terminal identification peptide imparting desired characteristics, e.g., stabilization or simplified purification of expressed recombinant product.

Useful expression vectors for bacterial use are constructed by inserting a structural DNA sequence encoding a desired protein together with suitable translation initiation and termination signals in operable reading phase with a functional promoter. The vector will comprise one or more phenotypic selectable markers and an origin of replication to ensure maintenance of the vector and, when desirable, provide amplification within the host.

Suitable prokaryotic hosts for transformation include strains of *Staphylococcus aureus*, *E. coli*, *B. subtilis*, *Salmonella typhimurium* and various species within the genera *Pseudomonas*, *Streptomyces*, and *Staphylococcus*. Others

may, also be employed as a matter of choice.

As a representative but non-limiting example, useful expression vectors for bacterial use can comprise a selectable marker and bacterial origin of replication derived from commercially available plasmids comprising genetic elements of the well known cloning vector pBR322 (ATCC 37017). Such commercial vectors include, for example, pKK223-3 (available from Pharmacia Fine Chemicals, Uppsala, Sweden) and GEM 1 (available from Promega Biotec, Madison, WI, USA). These pBR322 "backbone" sections are combined with an appropriate promoter and the structural sequence to be expressed.

Following transformation of a suitable host strain and growth of the host strain to an appropriate cell density, the selected promoter, where it is inducible, is derepressed or induced by appropriate means (e.g., temperature shift or chemical induction) and cells are cultured for an additional period to provide for expression of the induced gene product. Thereafter cells are typically harvested, generally by centrifugation, disrupted to release expressed protein, generally by physical or chemical means, and the resulting crude extract is retained for further purification.

Various mammalian cell culture systems can also be employed to express recombinant protein. Examples of mammalian expression systems include the COS-7 lines of monkey kidney fibroblasts, described in Gluzman, *Cell* 23: 175 (1981), and other cell lines capable of expressing a compatible vector, for example, the C127, 3T3, CHO, HeLa and BHK cell lines.

Mammalian expression vectors will comprise an origin of replication, a suitable promoter and enhancer, and also any necessary ribosome binding sites, polyadenylation site, splice donor and acceptor sites, transcriptional termination sequences, and 5' flanking nontranscribed sequences. DNA sequences derived from the SV40 viral genome, for example, SV40 origin, early promoter, enhancer, splice, and polyadenylation sites may be used to provide the required nontranscribed genetic elements.

Recombinant polypeptides and proteins produced in bacterial culture is usually isolated by initial extraction from cell pellets, followed by one or more salting-out, aqueous ion exchange or size exclusion chromatography steps. Microbial cells employed in expression of proteins can be disrupted by any convenient method, including freeze-thaw cycling, sonication, mechanical disruption, or use of cell lysing agents. Protein refolding steps can be used, as necessary, in completing configuration of the mature protein. Finally, high performance liquid chromatography (HPLC) can be employed for final purification steps.

An additional aspect of the invention includes *Staphylococcus aureus* polypeptides which are useful as immunodiagnostic antigens and/or immunoprotective vaccines, collectively "immunologically useful polypeptides". Such immunologically useful polypeptides may be selected from the ORFs disclosed herein based on techniques well known in the art and described elsewhere herein. The inventors have used the following criteria to select several immunologically useful polypeptides:

As is known in the art, an amino terminal type I signal sequence directs a nascent protein across the plasma and outer membranes to the exterior of the bacterial cell. Such outer membrane polypeptides are expected to be immunologically useful. According to Izard, J. W. et al., *Mol. Microbiol.* 13, 765-773; (1994), polypeptides containing type I signal sequences contain the following physical attributes: The length of the type I signal sequence is approximately 15 to 25 primarily hydrophobic amino acid residues with a net positive charge in the extreme amino terminus; the central region of the signal sequence must adopt an alpha-helical conformation in a hydrophobic environment; and the region surrounding the actual site of cleavage is ideally six residues long, with small side-chain amino acids in the -1 and -3 positions.

Also known in the art is the type IV signal sequence which is an example of the several types of functional signal sequences which exist in addition to the type I signal sequence detailed above. Although functionally related, the type IV signal sequence possesses a unique set of biochemical and physical attributes (Strom, M. S. and Lory, S., *J. Bacteriol.* 174, 7345-7351; 1992). These are typically six to eight amino acids with a net basic charge followed by an additional sixteen to thirty primarily hydrophobic residues. The cleavage site of a type IV signal sequence is typically after the initial six to eight amino acids at the extreme amino terminus. In addition, all type IV signal sequences contain a phenylalanine residue at the +1 site relative to the cleavage site.

Studies of the cleavage sites of twenty-six bacterial lipoprotein precursors has allowed the definition of a consensus amino acid sequence for lipoprotein cleavage. Nearly three-fourths of the bacterial lipoprotein precursors examined contained the sequence L-(A,S)-(G,A)-C at positions -3 to +1, relative to the point of cleavage (Hayashi, S. and Wu, H. C. *Lipoproteins in bacteria*. *J. Bioenerg. Biomembr.* 22, 451-471; 1990).

It well known that most anchored proteins found on the surface of gram-positive bacteria possess a highly conserved carboxy terminal sequence. More than fifty such proteins from organisms such as *S. pyogenes*, *S. mutans*, *E. faecalis*, *S. pneumoniae*, and others, have been identified based on their extracellular location and carboxy terminal amino acid sequence (Fischetti, V. A. *Gram-positive commensal bacteria deliver antigens to elicit mucosal and systemic immunity*. *ASM News* 62, 405410; 1996). The conserved region is comprised of six charged amino acids at the extreme carboxy terminus coupled to 15-20 hydrophobic amino acids presumed to function as a transmembrane domain. Immediately adjacent to the transmembrane domain is a six amino acid sequence conserved in nearly all proteins ex-

aminated. The amino acid sequence of this region is L-P-X-T-G-X, where X is any amino acid.

Amino acid sequence similarities to proteins of known function by BLAST enables the assignment of putative functions to novel amino acid sequences and allows for the selection of proteins thought to function outside the cell wall. Such proteins are well known in the art and include "lipoprotein", "periplasmic", or "antigen".

An algorithm for selecting antigenic and immunogenic *Staphylococcus aureus* polypeptides including the foregoing criteria was developed by the present inventors. Use of the algorithm by the inventors to select immunologically useful *Staphylococcus aureus* polypeptides resulted in the selection of several ORFs which are predicted to be outer-membrane-associated proteins. These proteins are identified in Table 4, below, and shown in the Sequence Listing as SEQ ID NOS:5,192 to 5,255. Thus the amino acid sequence of each of several antigenic *Staphylococcus aureus* polypeptides listed in Table 4 can be determined, for example, by locating the amino acid sequence of the ORF in the Sequence Listing. Likewise the polynucleotide sequence encoding each ORF can be found by locating the corresponding polynucleotide SEQ ID in Tables 1, 2, or 3, and finding the corresponding nucleotide sequence in the sequence listing.

As will be appreciated by those of ordinary skill in the art, although a polypeptide representing an entire ORF may be the closest approximation to a protein found *in vivo*, it is not always technically practical to express a complete ORF *in vitro*. It may be very challenging to express and purify a highly hydrophobic protein by common laboratory methods. As a result, the immunologically useful polypeptides described herein as SEQ ID NOS:5,192-5,255 may have been modified slightly to simplify the production of recombinant protein, and are the preferred embodiments. In general, nucleotide sequences which encode highly hydrophobic domains, such as those found at the amino terminal signal sequence, are excluded for enhanced *in vitro* expression of the polypeptides. Furthermore, any highly hydrophobic amino acid sequences occurring at the carboxy terminus are also excluded. Such truncated polypeptides include for example the mature forms of the polypeptides expected to exist in nature.

Those of ordinary skill in the art can identify soluble portions the polypeptide identified in Table 4, and in the case of truncated polypeptides sequences shown as SEQ ID NOS:5,192-5,255, may obtain the complete predicted amino acid sequence of each polypeptide by translating the corresponding polynucleotides sequences of the corresponding ORF listed in Tables 1, 2 and 3 and found in the sequence listing.

Accordingly, polypeptides comprising the complete amino acid of an immunologically useful polypeptide selected from the group of polypeptides encoded by the ORFs identified in Table 4, or an amino acid sequence at least 95% identical thereto, preferably at least 97% identical thereto, and most preferably at least 99% identical thereto form an embodiment of the invention; in addition polypeptides comprising an amino acid sequence selected from the group of amino acid sequences shown in the sequence listing as SEQ ID NOS:5,191-5,255, or an amino acid sequence at least 95% identical thereto, preferably at least 97% identical thereto and most preferably at least 99% identical thereto, form an embodiment of the invention. Polynucleotides encoding the foregoing polypeptides also form part of the present invention.

In another aspect, the invention provides a peptide or polypeptide comprising an epitope-bearing portion of a polypeptide of the invention, particularly those epitope-bearing portions (antigenic regions) identified in Table 4. The epitope-bearing portion is an immunogenic or antigenic epitope of a polypeptide of the invention. An "immunogenic epitope" is defined as a part of a protein that elicits an antibody response when the whole protein is the immunogen. On the other hand, a region of a protein molecule to which an antibody can bind is defined as an "antigenic epitope." The number of immunogenic epitopes of a protein generally is less than the number of antigenic epitopes. See, for instance, Geysen et al., Proc. Natl. Acad. Sci. USA 81:3998-4002 (1983).

As to the selection of peptides or polypeptides bearing an antigenic epitope (i.e., that contain a region of a protein molecule to which an antibody can bind), it is well known in that art that relatively short synthetic peptides that mimic part of a protein sequence are routinely capable of eliciting an antiserum that reacts with the partially mimicked protein. See, for instance, Sutcliffe, J. G., Shinnick, T. M., Green, N. and Learner, R. A. (1983) "Antibodies that react with predetermined sites on proteins", Science, 219:660-666. Peptides capable of eliciting protein-reactive sera are frequently represented in the primary sequence of a protein, can be characterized by a set of simple chemical rules, and are confined neither to immunodominant regions of intact proteins (i.e., immunogenic epitopes) nor to the amino or carboxyl terminals. Antigenic epitope-bearing peptides and polypeptides of the invention are therefore useful to raise antibodies, including monoclonal antibodies, that bind specifically to a polypeptide of the invention. See, for instance, Wilson et al., Cell 37:767-778 (1984) at 777.

Antigenic epitope-bearing peptides and polypeptides of the invention preferably contain a sequence of at least seven, more preferably at least nine and most preferably between about 15 to about 30 amino acids contained within the amino acid sequence of a polypeptide of the invention. Non-limiting examples of antigenic polypeptides or peptides that can be used to generate *S. aureus* specific antibodies include: a polypeptide comprising peptides shown in Table 4 below. These polypeptide fragments have been determined to bear antigenic epitopes of indicated *S. aureus* proteins by the analysis of the Jameson-Wolf antigenic index, a representative sample of which is shown in Figure 3.

The epitope-bearing peptides and polypeptides of the invention may be produced by any conventional means. See, e.g., Houghten, R. A. (1985) General method for the rapid solid-phase synthesis of large numbers of peptides:

specificity of antigen-antibody interaction at the level of individual amino acids. Proc. Natl. Acad. Sci. USA 82: 5131-5135; this "Simultaneous Multiple Peptide Synthesis (SMPS)" process is further described in U.S. Patent No. 4,631,211 to Houghten et al. (1986). Epitope-bearing peptides and polypeptides of the invention are used to induce antibodies according to methods well known in the art. See, for instance, Sutcliffe et al., supra; Wilson et al., supra; Chow, M. et al., Proc. Natl. Acad. Sci. USA 82:910-914; and Bittle, F. J. et al., J. Gen. Virol. 66:2347-2354 (1985).

Immunogenic epitope-bearing peptides of the invention, i.e., those parts of a protein that elicit an antibody response when the whole protein is the immunogen, are identified according to methods known in the art. See, for instance, Geysen et al., supra. Further still, U.S. Patent No. 5,194,392 to Geysen (1990) describes a general method of detecting or determining the sequence of monomers (amino acids or other compounds) which is a topological equivalent of the epitope (i.e., a "mimotope") which is complementary to a particular paratope (antigen binding site) of an antibody of interest. More generally, U.S. Patent No. 4,433,092 to Geysen (1989) describes a method of detecting or determining a sequence of monomers which is a topographical equivalent of a ligand which is complementary to the ligand binding site of a particular receptor of interest. Similarly, U.S. Patent No. 5,480,971 to Houghten, R. A. et al. (1996) on Per-alkylated Oligopeptide Mixtures discloses linear C1-C7-alkyl peralkylated oligopeptides and sets and libraries of such peptides, as well as methods for using such oligopeptide sets and libraries for determining the sequence of a per-alkylated oligopeptide that preferentially binds to an acceptor molecule of interest. Thus, non-peptide analogs of the epitope-bearing peptides of the invention also can be made routinely by these methods.

Table 4 lists immunologically useful polypeptides identified by an algorithm which locates novel *Staphylococcus aureus* outer membrane proteins, as is described above. Also listed are epitopes or "antigenic regions" of each of the identified polypeptides. The antigenic regions, or epitopes, are delineated by two numbers x-y, where x is the number of the first amino acid in the open reading frame included within the epitope and y is the number of the last amino acid in the open reading frame included within the epitope. For example, the first epitope in ORF 168-6 is comprised of amino acids 36 to 45 of SEQ ID NO:5,192, as is described in Table 4. The inventors have identified several epitopes for each of the antigenic polypeptides identified in Table 4. Accordingly, forming part of the present invention are polypeptides comprising an amino acid sequence of one or more antigenic regions identified in Table 4. The invention further provides polynucleotides encoding such polypeptides.

The present invention further includes isolated polypeptides, proteins and nucleic acid molecules which are substantially equivalent to those herein described. As used herein, substantially equivalent can refer both to nucleic acid and amino acid sequences, for example a mutant sequence, that varies from a reference sequence by one or more substitutions, deletions, or additions, the net effect of which does not result in an adverse functional dissimilarity between reference and subject sequences. For purposes of the present invention, sequences having equivalent biological activity, and equivalent expression characteristics are considered substantially equivalent. For purposes of determining equivalence, truncation of the mature sequence should be disregarded.

The invention further provides methods of obtaining homologs from other strains of *Staphylococcus aureus*, of the fragments of the *Staphylococcus aureus* genome of the present invention and homologs of the proteins encoded by the ORFs of the present invention. As used herein, a sequence or protein of *Staphylococcus aureus* is defined as a homolog of a fragment of the *Staphylococcus aureus* fragments or contigs or a protein encoded by one of the ORFs of the present invention, if it shares significant homology to one of the fragments of the *Staphylococcus aureus* genome, of the present invention or a protein encoded by one of the ORFs of the present invention. Specifically, by using the sequence disclosed herein as a probe or as primers, and techniques such as PCR cloning and colony/plaque hybridization, one skilled in the art can obtain homologs.

As used herein, two nucleic acid molecules or proteins are said to "share significant homology" if the two contain regions which possess greater than 85% sequence (amino acid or nucleic acid) homology. Preferred homologs in this regard are those with more than 90% homology. Especially preferred are those with 93% or more homology. Among especially preferred homologs those with 95% or more homology are particularly preferred. Very particularly preferred among these are those with 97% and even more particularly preferred among these are homologs with 99% or more homology. The most preferred homologs among these are those with 99.9% homology or more. It will be understood that, among measures of homology, identity is particularly preferred in this regard.

Region specific primers or probes derived from the nucleotide sequence provided in SEQ ID NOS:1-5,191 or from a nucleotide sequence at least 95%, particularly at least 99%, especially at least 99.5% identical to a sequence of SEQ ID NOS:1-5,191 can be used to prime DNA synthesis and PCR amplification, as well as to identify colonies containing cloned DNA encoding a homolog. Methods suitable to this aspect of the present invention are well known and have been described in great detail in many publications such as, for example, Innis et al., PCR PROTOCOLS, Academic Press, San Diego, CA (1990).

When using primers derived from SEQ ID NOS:1-5,191 or from a nucleotide sequence having an aforementioned identity to a sequence of SEQ ID NOS:1-5,191, one skilled in the art will recognize that by employing high stringency conditions (e.g., annealing at 50-60°C in 6X SSPE and 50% formamide, and washing at 50-65°C in 0.5X SSPE) only sequences which are greater than 75% homologous to the primer will be amplified. By employing lower stringency

conditions (e.g., hybridizing at 35-37°C in 5X SSPC and 40-45% formamide, and washing at 42°C in 0.5X SSPC), sequences which are greater than 40-50% homologous to the primer will also be amplified.

When using DNA probes derived from SEQ ID NOS:1-5,191, or from a nucleotide sequence having an aforementioned identity to a sequence of SEQ ID NOS:1-5,191, for colony/plaque hybridization, one skilled in the art will recognize that by employing high stringency conditions (e.g., hybridizing at 50- 65°C in 5X SSPC and 50% formamide, and washing at 50- 65°C in 0.5X SSPC), sequences having regions which are greater than 90% homologous to the probe can be obtained, and that by employing lower stringency conditions (e.g., hybridizing at 35-37°C in 5X SSPC and 40-45% formamide, and washing at 42°C in 0.5X SSPC), sequences having regions which are greater than 35-45% homologous to the probe will be obtained.

Any organism can be used as the source for homologs of the present invention so long as the organism naturally expresses such a protein or contains genes encoding the same. The most preferred organism for isolating homologs are bacterias which are closely related to *Staphylococcus aureus*.

ILLUSTRATIVE USES OF COMPOSITIONS OF THE INVENTION

Each ORF provided in Tables 1 and 2 is identified with a function by homology to a known gene or polypeptide. As a result, one skilled in the art can use the polypeptides of the present invention for commercial, therapeutic and industrial purposes consistent with the type of putative identification of the polypeptide. Such identifications permit one skilled in the art to use the *Staphylococcus aureus* ORFs in a manner similar to the known type of sequences for which the identification is made; for example, to ferment a particular sugar source or to produce a particular metabolite. A variety of reviews illustrative of this aspect of the invention are available, including the following reviews on the industrial use of enzymes, for example, BIOCHEMICAL ENGINEERING AND BIOTECHNOLOGY HANDBOOK, 2nd Ed., Macmillan Publications, Ltd. NY (1991) and BIOCATALYSTS IN ORGANIC SYNTHESIS, Tramper *et al.*, Eds., Elsevier Science Publishers, Amsterdam, The Netherlands (1985). A variety of exemplary uses that illustrate this and similar aspects of the present invention are discussed below.

1. Biosynthetic Enzymes

Open reading frames encoding proteins involved in mediating the catalytic reactions involved in intermediary and macromolecular metabolism, the biosynthesis of small molecules, cellular processes and other functions includes enzymes involved in the degradation of the intermediary products of metabolism, enzymes involved in central intermediary metabolism, enzymes involved in respiration, both aerobic and anaerobic, enzymes involved in fermentation, enzymes involved in ATP proton motor force conversion, enzymes involved in broad regulatory function, enzymes involved in amino acid synthesis, enzymes involved in nucleotide synthesis, enzymes involved in cofactor and vitamin synthesis, can be used for industrial biosynthesis.

The various metabolic pathways present in *Staphylococcus aureus* can be identified based on absolute nutritional requirements as well as by examining the various enzymes identified in Table 1-3 and SEQ ID NOS:1-5,191.

Of particular interest are polypeptides involved in the degradation of intermediary metabolites as well as non-macromolecular metabolism. Such enzymes include amylases, glucose oxidases, and catalase.

Proteolytic enzymes are another class of commercially important enzymes. Proteolytic enzymes find use in a number of industrial processes including the processing of flax and other vegetable fibers, in the extraction, clarification and depectinization of fruit juices, in the extraction of vegetables' oil and in the maceration of fruits and vegetables to give unicellular fruits. A detailed review of the proteolytic enzymes used in the food industry is provided in Rombouts *et al.*, *Symbiosis* 21: 79 (1986) and Voragen *et al.* in BIOCATALYSTS IN AGRICULTURAL BIOTECHNOLOGY, Whitaker *et al.*, Eds., *American Chemical Society Symposium Series* 389: 93 (1989).

The metabolism of sugars is an important aspect of the primary metabolism of *Staphylococcus aureus*. Enzymes involved in the degradation of sugars, such as, particularly, glucose, galactose, fructose and xylose, can be used in industrial fermentation. Some of the important sugar transforming enzymes, from a commercial viewpoint, include sugar isomerases such as glucose isomerase. Other metabolic enzymes have found commercial use such as glucose oxidases which produces ketogulonic acid (KGA). KGA is an intermediate in the commercial production of ascorbic acid using the Reichstein's procedure, as described in Krueger *et al.*, *Biotechnology* 6(A), Rhine *et al.*, Eds., Verlag Press, Weinheim, Germany (1984).

Glucose oxidase (GOD) is commercially available and has been used in purified form as well as in an immobilized form for the deoxygenation of beer. See, for instance, Hartmeir *et al.*, *Biotechnology Letters* 1: 21 (1979). The most important application of GOD is the industrial scale fermentation of gluconic acid. Market for gluconic acids which are used in the detergent, textile, leather, photographic, pharmaceutical, food, feed and concrete industry, as described, for example, in Bigelis *et al.*, beginning on page 357 in GENE MANIPULATIONS AND FUNGI; Benett *et al.*, Eds., Academic Press, New York (1985). In addition to industrial applications, GOD has found applications in medicine for

quantitative determination of glucose in body fluids recently in biotechnology for analyzing syrups from starch and cellulose hydrosylates. This application is described in Owusu *et al.*, *Biochem. et Biophysica. Acta.* 872: 83 (1986), for instance.

The main sweetener used in the world today is sugar which comes from sugar beets and sugar cane. In the field of industrial enzymes, the glucose isomerase process shows the largest expansion in the market today. Initially, soluble enzymes were used and later immobilized enzymes were developed (Krueger *et al.*, *Biotechnology, The Textbook of Industrial Microbiology*, Sinauer Associated Incorporated, Sunderland, Massachusetts (1990)). Today, the use of glucose-produced high fructose syrups is by far the largest industrial business using immobilized enzymes. A review of the industrial use of these enzymes is provided by Jorgensen, *Starch* 40:307 (1988).

Proteinases, such as alkaline serine proteinases, are used as detergent additives and thus represent one of the largest volumes of microbial enzymes used in the industrial sector. Because of their industrial importance, there is a large body of published and unpublished information regarding the use of these enzymes in industrial processes. (See Faultman *et al.*, *Acid Proteinases Structure Function and Biology*, Tang, J., ed., Plenum Press, New York (1977) and Godfrey *et al.*, *Industrial Enzymes*, MacMillan Publishers, Surrey, UK (1983) and Hepner *et al.*, *Report Industrial Enzymes by 1990*, Hel Hepner & Associates, London (1986)).

Another class of commercially usable proteins of the present invention are the microbial lipases, described by, for instance, Macrae *et al.*, *Philosophical Transactions of the Chiral Society of London* 310:227 (1985) and Poserke, *Journal of the American Oil Chemist Society* 61:1758 (1984). A major use of lipases is in the fat and oil industry for the production of neutral glycerides using lipase catalyzed inter-esterification of readily available triglycerides. Application of lipases include the use as a detergent additive to facilitate the removal of fats from fabrics in the course of the washing procedures.

The use of enzymes, and in particular microbial enzymes, as catalyst for key steps in the synthesis of complex organic molecules is gaining popularity at a great rate. One area of great interest is the preparation of chiral intermediates. Preparation of chiral intermediates is of interest to a wide range of synthetic chemists particularly those scientists involved with the preparation of new pharmaceuticals, agrochemicals, fragrances and flavors. (See Davies *et al.*, *Recent Advances in the Generation of Chiral Intermediates Using Enzymes*, CRC Press, Boca Raton, Florida (1990)). The following reactions catalyzed by enzymes are of interest to organic chemists: hydrolysis of carboxylic acid esters, phosphate esters, amides and nitriles, esterification reactions, trans-esterification reactions, synthesis of amides, reduction of alkanones and oxoalkanates, oxidation of alcohols to carbonyl compounds, oxidation of sulfides to sulfoxides, and carbon bond forming reactions such as the aldol reaction.

When considering the use of an enzyme encoded by one of the ORFs of the present invention for biotransformation and organic synthesis it is sometimes necessary to consider the respective advantages and disadvantages of using a microorganism as opposed to an isolated enzyme. Pros and cons of using a whole cell system on the one hand or an isolated partially purified enzyme on the other hand, has been described in detail by Bud *et al.*, *Chemistry in Britain* (1987), p. 127.

Amino transferases, enzymes involved in the biosynthesis and metabolism of amino acids, are useful in the catalytic production of amino acids. The advantages of using microbial based enzyme systems is that the amino transferase enzymes catalyze the stereo-selective synthesis of only L-amino acids and generally possess uniformly high catalytic rates. A description of the use of amino transferases for amino acid production is provided by Roselle-David, *Methods of Enzymology* 136:479 (1987).

Another category of useful proteins encoded by the ORFs of the present invention include enzymes involved in nucleic acid synthesis, repair, and recombination. A variety of commercially important enzymes have previously been isolated from members of *Staphylococcus aureus*. These include Sau3A and Sau96I.

2. Generation of Antibodies

As described here, the proteins of the present invention, as well as homologs thereof, can be used in a variety of procedures and methods known in the art which are currently applied to other proteins. The proteins of the present invention can further be used to generate an antibody which selectively binds the protein. Such antibodies can be either monoclonal or polyclonal antibodies, as well fragments of these antibodies, and humanized forms.

The invention further provides antibodies which selectively bind to one of the proteins of the present invention and hybridomas which produce these antibodies. A hybridoma is an immortalized cell line which is capable of secreting a specific monoclonal antibody.

In general, techniques for preparing polyclonal and monoclonal antibodies as well as hybridomas capable of producing the desired antibody are well known in the art (Campbell, A. M., *MONOCLONAL ANTIBODY TECHNOLOGY: LABORATORY TECHNIQUES IN BIOCHEMISTRY AND MOLECULAR BIOLOGY*, Elsevier Science Publishers, Amsterdam, The Netherlands (1984); St. Groth *et al.*, *J. Immunol. Methods* 35: 1-21 (1980), Kohler and Milstein, *Nature* 256: 495-497 (1975)), the trioma technique, the human B- cell hybridoma technique (Kozbor *et al.*, *Immunology Today*

4: 72 (1983), pgs. 77-96 of Cole *et al.*, in MONOCLONAL ANTIBODIES AND CANCER THERAPY, Alan R. Liss, Inc. (1985)).

Any animal (mouse, rabbit, *etc.*) which is known to produce antibodies can be immunized with the pseudogene polypeptide. Methods for immunization are well known in the art. Such methods include subcutaneous or interperitoneal injection of the polypeptide. One skilled in the art will recognize that the amount of the protein encoded by the ORF of the present invention used for immunization will vary based on the animal which is immunized, the antigenicity of the peptide and the site of injection.

The protein which is used as an immunogen may be modified or administered in an adjuvant in order to increase the protein's antigenicity. Methods of increasing the antigenicity of a protein are well known in the art and include, but are not limited to coupling the antigen with a heterologous protein (such as globulin or galactosidase) or through the inclusion of an adjuvant during immunization.

For monoclonal antibodies, spleen cells from the immunized animals are removed, fused with myeloma cells, such as SP2/0-Ag14 myeloma cells, and allowed to become monoclonal antibody producing hybridoma cells.

Any one of a number of methods well known in the art can be used to identify the hybridoma cell which produces an antibody with the desired characteristics. These include screening the hybridomas with an ELISA assay, western blot analysis, or radioimmunoassay (Lutz *et al.*, *Exp. Cell Res.* 175: 109-124 (1988)).

Hybridomas secreting the desired antibodies are cloned and the class and subclass is determined using procedures known in the art (Campbell, A. M., *Monoclonal Antibody Technology: Laboratory Techniques in Biochemistry and Molecular Biology*, Elsevier Science Publishers, Amsterdam, The Netherlands (1984)).

Techniques described for the production of single chain antibodies (U. S. Patent 4,946,778) can be adapted to produce single chain antibodies to proteins of the present invention.

For polyclonal antibodies, antibody containing antisera is isolated from the immunized animal and is screened for the presence of antibodies with the desired specificity using one of the above-described procedures.

The present invention further provides the above-described antibodies in detectably labelled form. Antibodies can be detectably labelled through the use of radioisotopes, affinity labels (such as biotin, avidin, *etc.*), enzymatic labels (such as horseradish peroxidase, alkaline phosphatase, *etc.*) fluorescent labels (such as FITC or rhodamine, *etc.*), paramagnetic atoms, *etc.* Procedures for accomplishing such labelling are well-known in the art, for example see Sternberger *et al.*, *J. Histochem. Cytochem.* 18:315 (1970); Bayer, E. A. *et al.*, *Meth. Enzym.* 62:308 (1979); Engval, E. *et al.*, *Immunol.* 109:129 (1972); Goding, J. W. J. *Immunol. Meth.* 13:215 (1976)).

The labeled antibodies of the present invention can be used for *in vitro*, *in vivo*, and in situ assays to identify cells or tissues in which a fragment of the *Staphylococcus aureus* genome is expressed.

The present invention further provides the above-described antibodies immobilized on a solid support. Examples of such solid supports include plastics such as polycarbonate, complex carbohydrates such as agarose and sepharose, acrylic resins and such as polyacrylamide and latex beads. Techniques for coupling antibodies to such solid supports are well known in the art (Weir, D. M. *et al.*, "Handbook of Experimental Immunology" 4th Ed., Blackwell Scientific Publications, Oxford, England, Chapter 10 (1986); Jacoby, W. D. *et al.*, *Meth. Enzym.* 34 Academic Press, N. Y. (1974)). The immobilized antibodies of the present invention can be used for *in vitro*, *in vivo*, and in situ assays as well as for immunoaffinity purification of the proteins of the present invention.

3. Diagnostic Assays and Kits

The present invention further provides methods to identify the expression of one of the ORFs of the present invention, or homolog thereof, in a test sample, using one of the DFs, antigens or antibodies of the present invention.

In detail, such methods comprise incubating a test sample with one or more of the antibodies, or one or more of the DFs, or one or more antigens of the present invention and assaying for binding of the DFs, antigens or antibodies to components within the test sample.

Conditions for incubating a DF, antigen or antibody with a test sample vary. Incubation conditions depend on the format employed in the assay, the detection methods employed, and the type and nature of the DF or antibody used in the assay. One skilled in the art will recognize that any one of the commonly available hybridization, amplification or immunological assay formats can readily be adapted to employ the DFs, antigens or antibodies of the present invention. Examples of such assays can be found in Chard, T., *An Introduction to Radioimmunoassay and Related Techniques*, Elsevier Science Publishers, Amsterdam, The Netherlands (1986); Bullock, G. R. *et al.*, *Techniques in Immunocytochemistry*, Academic Press, Orlando, FL Vol. 1 (1982), Vol. 2 (1983), Vol. 3 (1985); Tijssen, P., *Practice and Theory of Enzyme Immunoassays: Laboratory Techniques in Biochemistry*, PCT publication WO95/32291, and *Molecular Biology*, Elsevier Science Publishers, Amsterdam, The Netherlands (1985), all of which are hereby incorporated herein by reference.

The test samples of the present invention include cells, protein or membrane extracts of cells, or biological fluids such as sputum, blood, serum, plasma, or urine. The test sample used in the above-described method will vary based

on the assay format, nature of the detection method and the tissues, cells or extracts used as the sample to be assayed. Methods for preparing protein extracts or membrane extracts of cells are well known in the art and can be readily be adapted in order to obtain a sample which is compatible with the system utilized.

In another embodiment of the present invention, kits are provided which contain the necessary reagents to carry out the assays of the present invention.

Specifically, the invention provides a compartmentalized kit to receive, in close confinement, one or more containers which comprises: (a) a first container comprising one of the Dfs, antigens or antibodies of the present invention; and (b) one or more other containers comprising one or more of the following: wash reagents, reagents capable of detecting presence of a bound DF, antigen or antibody.

In detail, a compartmentalized kit includes any kit in which reagents are contained in separate containers. Such containers include small glass containers, plastic containers or strips of plastic or paper. Such containers allows one to efficiently transfer reagents from one compartment to another compartment such that the samples and reagents are not cross-contaminated, and the agents or solutions of each container can be added in a quantitative fashion from one compartment to another. Such containers will include a container which will accept the test sample, a container which contains the antibodies used in the assay, containers which contain wash reagents (such as phosphate buffered saline, Tris-buffers, etc.), and containers which contain the reagents used to detect the bound antibody, antigen or DF.

Types of detection reagents include labelled nucleic acid probes, labelled secondary antibodies, or in the alternative, if the primary antibody is labelled, the enzymatic, or antibody binding reagents which are capable of reacting with the labelled antibody. One skilled in the art will readily recognize that the disclosed Dfs, antigens and antibodies of the present invention can be readily incorporated into one of the established kit formats which are well known in the art.

4. Screening Assay for Binding Agents

Using the isolated proteins of the present invention, the present invention further provides methods of obtaining and identifying agents which bind to a protein encoded by one of the ORFs of the present invention or to one of the fragments and the *Staphylococcus aureus* fragment and contigs herein described.

In general, such methods comprise steps of:

- (a) contacting an agent with an isolated protein encoded by one of the ORFs of the present invention, or an isolated fragment of the *Staphylococcus aureus* genome; and
- (b) determining whether the agent binds to said protein or said fragment.

The agents screened in the above assay can be, but are not limited to, peptides, carbohydrates, vitamin derivatives, or other pharmaceutical agents. The agents can be selected and screened at random or rationally selected or designed using protein modeling techniques.

For random screening, agents such as peptides, carbohydrates, pharmaceutical agents and the like are selected at random and are assayed for their ability to bind to the protein encoded by the ORF of the present invention.

Alternatively, agents may be rationally selected or designed. As used herein, an agent is said to be "rationally selected or designed" when the agent is chosen based on the configuration of the particular protein. For example, one skilled in the art can readily adapt currently available procedures to generate peptides, pharmaceutical agents and the like capable of binding to a specific peptide sequence in order to generate rationally designed antipeptide peptides, for example see Hurby *et al.*, Application of Synthetic Peptides: Antisense Peptides," In Synthetic Peptides, A User's Guide, W. H. Freeman, NY (1992), pp. 289-307, and Kaspiczak *et al.*, Biochemistry 28:9230-8 (1989), or pharmaceutical agents, or the like.

In addition to the foregoing, one class of agents of the present invention, as broadly described, can be used to control gene expression through binding to one of the ORFs or EMFs of the present invention. As described above, such agents can be randomly screened or rationally designed/selected. Targeting the ORF or EMF allows a skilled artisan to design sequence specific or element specific agents, modulating the expression of either a single ORF or multiple ORFs which rely on the same EMF for expression control.

One class of DNA binding agents are agents which contain base residues which hybridize or form a triple helix by binding to DNA or RNA. Such agents can be based on the classic phosphodiester, ribonucleic acid backbone, or can be a variety of sulfhydryl or polymeric derivatives which have base attachment capacity.

Agents suitable for use in these methods usually contain 20 to 40 bases and are designed to be complementary to a region of the gene involved in transcription (triple helix - see Lee *et al.*, Nucl. Acids Res. 6:3073 (1979); Cooney *et al.*, Science 241:456 (1988); and Dervan *et al.*, Science 251: 1360 (1991)) or to the mRNA itself (antisense - Okano, J. Neurochem. 56:560 (1991); Oligodeoxynucleotides as Antisense Inhibitors of Gene Expression, CRC Press, Boca Raton, FL (1988)). Triple helix-formation optimally results in a shut-off of RNA transcription from DNA, while antisense RNA hybridization blocks translation of an mRNA molecule into polypeptide. Both techniques have been demonstrated

to be effective in model systems. Information contained in the sequences of the present invention can be used to design antisense and triple helix-forming oligonucleotides, and other DNA binding agents.

5. Pharmaceutical Compositions and Vaccines

The present invention further provides pharmaceutical agents which can be used to modulate the growth or pathogenicity of *Staphylococcus aureus*, or another related organism, *in vivo* or *in vitro*. As used herein, a "pharmaceutical agent" is defined as a composition of matter which can be formulated using known techniques to provide a pharmaceutical compositions. As used herein, the "pharmaceutical agents of the present invention" refers the pharmaceutical agents which are derived from the proteins encoded by the ORFs of the present invention or are agents which are identified using the herein described assays.

As used herein, a pharmaceutical agent is said to "modulate the growth or pathogenicity of *Staphylococcus aureus* or a related organism, *in vivo* or *in vitro*," when the agent reduces the rate of growth, rate of division, or viability of the organism in question. The pharmaceutical agents of the present invention can modulate the growth or pathogenicity of an organism in many fashions, although an understanding of the underlying mechanism of action is not needed to practice the use of the pharmaceutical agents of the present invention. Some agents will modulate the growth or pathogenicity by binding to an important protein thus blocking the biological activity of the protein, while other agents may bind to a component of the outer surface of the organism blocking attachment or rendering the organism more prone to act the bodies nature immune system. Alternatively, the agent may comprise a protein encoded by one of the ORFs of the present invention and serve as a vaccine. The development and use of vaccines derived from membrane associated polypeptides are well known in the art. The inventors have identified particularly preferred immunogenic *Staphylococcus aureus* polypeptides for use as vaccines. Such immunogenic polypeptides are described above and summarized in Table 4, below.

As used herein, a "related organism" is a broad term which refers to any organism whose growth or pathogenicity can be modulated by one of the pharmaceutical agents of the present invention. In general, such an organism will contain a homolog of the protein which is the target of the pharmaceutical agent or the protein used as a vaccine. As such, related organisms do not need to be bacterial but may be fungal or viral pathogens.

The pharmaceutical agents and compositions of the present invention may be administered in a convenient manner, such as by the oral, topical, intravenous, intraperitoneal, intramuscular, subcutaneous, intranasal or intradermal routes. The pharmaceutical compositions are administered in an amount which is effective for treating and/or prophylaxis of the specific indication. In general, they are administered in an amount of at least about 1 mg/kg body weight and in most cases they will be administered in an amount not in excess of about 1 g/kg body weight per day. In most cases, the dosage is from about 0.1 mg/kg to about 10 g/kg body weight daily, taking into account the routes of administration, symptoms, etc.

The agents of the present invention can be used in native form or can be modified to form a chemical derivative. As used herein, a molecule is said to be a "chemical derivative" of another molecule when it contains additional chemical moieties not normally a part of the molecule. Such moieties may improve the molecule's solubility, absorption, biological half life, etc. The moieties may alternatively decrease the toxicity of the molecule, eliminate or attenuate any undesirable side effect of the molecule, etc. Moieties capable of mediating such effects are disclosed in, among other sources, REMINGTON'S PHARMACEUTICAL SCIENCES (1980) cited elsewhere herein.

For example, such moieties may change an immunological character of the functional derivative, such as affinity for a given antibody. Such changes in immunomodulation activity are measured by the appropriate assay, such as a competitive type immunoassay. Modifications of such protein properties as redox or thermal stability, biological half-life, hydrophobicity, susceptibility to proteolytic degradation or the tendency to aggregate with carriers or into multimers also may be effected in this way and can be assayed by methods well known to the skilled artisan.

The therapeutic effects of the agents of the present invention may be obtained by providing the agent to a patient by any suitable means (e.g., inhalation, intravenously, intramuscularly, subcutaneously, enterally, or parenterally). It is preferred to administer the agent of the present invention so as to achieve an effective concentration within the blood or tissue in which the growth of the organism is to be controlled. To achieve an effective blood concentration, the preferred method is to administer the agent by injection. The administration may be by continuous infusion, or by single or multiple injections.

In providing a patient with one of the agents of the present invention, the dosage of the administered agent will vary depending upon such factors as the patient's age, weight, height, sex, general medical condition, previous medical history, etc. In general, it is desirable to provide the recipient with a dosage of agent which is in the range of from about 1 pg/kg to 10 mg/kg (body weight of patient), although a lower or higher dosage may be administered. The therapeutically effective dose can be lowered by using combinations of the agents of the present invention or another agent.

As used herein, two or more compounds or agents are said to be administered "in combination" with each other when either (1) the physiological effects of each compound, or (2) the serum concentrations of each compound can

be measured at the same time. The composition of the present invention can be administered concurrently with, prior to, or following the administration of the other agent.

The agents of the present invention are intended to be provided to recipient subjects in an amount sufficient to decrease the rate of growth (as defined above) of the target organism.

The administration of the agent(s) of the invention may be for either a "prophylactic" or "therapeutic" purpose. When provided prophylactically, the agent(s) are provided in advance of any symptoms indicative of the organisms growth. The prophylactic administration of the agent(s) serves to prevent, attenuate, or decrease the rate of onset of any subsequent infection. When provided therapeutically, the agent(s) are provided at (or shortly after) the onset of an indication of infection. The therapeutic administration of the compound(s) serves to attenuate the pathological symptoms of the infection and to increase the rate of recovery.

The agents of the present invention are administered to a subject, such as a mammal, or a patient, in a pharmaceutically acceptable form and in a therapeutically effective concentration. A composition is said to be "pharmacologically acceptable" if its administration can be tolerated by a recipient patient. Such an agent is said to be administered in a "therapeutically effective amount" if the amount administered is physiologically significant. An agent is physiologically significant if its presence results in a detectable change in the physiology of a recipient patient.

The agents of the present invention can be formulated according to known methods to prepare pharmaceutically useful compositions, whereby these materials, or their functional derivatives, are combined in admixture with a pharmaceutically acceptable carrier vehicle. Suitable vehicles and their formulation, inclusive of other human proteins, e. g., human serum albumin, are described, for example, in REMINGTON'S PHARMACEUTICAL SCIENCES, 16th Ed., Osol, A., Ed., Mack Publishing, Easton PA (1980). In order to form a pharmaceutically acceptable composition suitable for effective administration, such compositions will contain an effective amount of one or more of the agents of the present invention, together with a suitable amount of carrier vehicle.

Additional pharmaceutical methods may be employed to control the duration of action. Control release preparations may be achieved through the use of polymers to complex or absorb one or more of the agents of the present invention. The controlled delivery may be effectuated by a variety of well known techniques, including formulation with macromolecules such as, for example, polyesters, polyamino acids, polyvinyl, pyrrolidone, ethylenevinylacetate, methylcellulose, carboxymethylcellulose, or protamine, sulfate, adjusting the concentration of the macromolecules and the agent in the formulation, and by appropriate use of methods of incorporation, which can be manipulated to effectuate a desired time course of release. Another possible method to control the duration of action by controlled release preparations is to incorporate agents of the present invention into particles of a polymeric material such as polyesters, polyamino acids, hydrogels, poly(lactic acid) or ethylene vinylacetate copolymers. Alternatively, instead of incorporating these agents into polymeric particles, it is possible to entrap these materials in microcapsules prepared, for example, by coacervation techniques or by interfacial polymerization with, for example, hydroxymethylcellulose or gelatine-microcapsules and poly(methylmethacrylate) microcapsules, respectively, or in colloidal drug delivery systems, for example, liposomes, albumin microspheres, microemulsions, nanoparticles, and nanocapsules or in macroemulsions. Such techniques are disclosed in REMINGTON'S PHARMACEUTICAL SCIENCES (1980).

The invention further provides a pharmaceutical pack or kit comprising one or more containers filled with one or more of the ingredients of the pharmaceutical compositions of the invention. Associated with such container(s) can be a notice in the form prescribed by a governmental agency regulating the manufacture, use or sale of pharmaceuticals or biological products, which notice reflects approval by the agency of manufacture, use or sale for human administration.

In addition, the agents of the present invention may be employed in conjunction with other therapeutic compounds.

6. Shot-Gun Approach to Megabase DNA Sequencing

The present invention further demonstrates that a large sequence can be sequenced using a random shotgun approach. This procedure, described in detail in the examples that follow, has eliminated the up front cost of isolating and ordering overlapping or contiguous subclones prior to the start of the sequencing protocols.

Certain aspects of the present invention are described in greater detail in the examples that follow. The examples are provided by way of illustration. Other aspects and embodiments of the present invention are contemplated by the inventors, as will be clear to those of skill in the art from reading the present disclosure.

ILLUSTRATIVE EXAMPLES**LIBRARIES AND SEQUENCING****1. Shotgun Sequencing Probability Analysis**

The overall strategy for a shotgun approach to whole genome sequencing follows from the Lander and Waterman (Landerman and Waterman, *Genomics* 2: 231 (1988)) application of the equation for the Poisson distribution. According to this treatment, the probability, P_0 , that any given base in a sequence of size L , in nucleotides, is not sequenced after a certain amount, n , in nucleotides, of random sequence has been determined can be calculated by the equation $P_0 = e^{-m}$, where m is L/n , the fold coverage.* For instance, for a genome of 2.8 Mb, $m=1$ when 2.8 Mb of sequence has been randomly generated (1X coverage). At that point, $P_0 = e^{-1} = 0.37$. The probability that any given base has not been sequenced is the same as the probability that any region of the whole sequence L has not been determined and, therefore, is equivalent to the fraction of the whole sequence that has yet to be determined. Thus, at one-fold coverage, approximately 37% of a polynucleotide of size L , in nucleotides has not been sequenced. When 14 Mb of sequence has been generated, coverage is 5X for a 2.8 Mb and the unsequenced fraction drops to .0067 or 0.67%. 5X coverage of a 2.8 Mb sequence can be attained by sequencing approximately 17,000 random clones from both insert ends with an average sequence read length of 410 bp.

Similarly, the total gap length, G , is determined by the equation $G = Le^{-m}$, and the average gap size, g , follows the equation, $g = L/n$. Thus, 5X coverage leaves about 240 gaps averaging about 82 bp in size in a sequence of a polynucleotide 2.8 Mb long.

The treatment above is essentially that of Lander and Waterman, *Genomics* 2: 231 (1988).

2. Random Library Construction

In order to approximate the random model described above during actual sequencing, a nearly ideal library of cloned genomic fragments is required. The following library construction procedure was developed to achieve this end.

Staphylococcus aureus DNA was prepared by phenol extraction. A mixture containing 600 ug DNA in 3.3 ml of 300 mM sodium acetate, 10 mM Tris-HCl, 1 mM Na-EDTA, 30% glycerol was sonicated for 1 min. at 0°C in a Branson Model 450 Sonicator at the lowest energy setting using a 3 mm probe. The sonicated DNA was ethanol precipitated and redissolved in 500 ul TE buffer.

To create blunt-ends, a 100 ul aliquot of the resuspended DNA was digested with 5 units of BAL31 nuclease (New England BioLabs) for 10 min at 30°C in 200 ul BAL31 buffer. The digested DNA was phenol-extracted, ethanol-precipitated, redissolved in 100 ul TE buffer, and then size-fractionated by electrophoresis through a 1.0% low melting temperature agarose gel. The section containing DNA fragments 1.6-2.0 kb in size was excised from the gel, and the LGT agarose was melted and the resulting solution was extracted with phenol to separate the agarose from the DNA. DNA was ethanol precipitated and redissolved in 20 ul of TE buffer for ligation to vector.

A two-step ligation procedure was used to produce a plasmid library with 97% inserts, of which >99% were single inserts. The first ligation mixture (50 ul) contained 2 ug of DNA fragments, 2 ug pUC18 DNA (Pharmacia) cut with SmaI and dephosphorylated with bacterial alkaline phosphatase, and 10 units of T4 ligase (GIBCO/BRL) and was incubated at 14°C for 4 hr. The ligation mixture then was phenol extracted and ethanol precipitated, and the precipitated DNA was dissolved in 20 ul TE buffer and electrophoresed on a 1.0% low melting agarose gel. Discrete bands in a ladder were visualized by ethidium bromide-staining and UV illumination and identified by size as insert (i), vector (v), v+i, v+2i, v+3i, etc. The portion of the gel containing v+i DNA was excised and the v+i DNA was recovered and resuspended into 20 ul TE. The v+i DNA then was blunt-ended by T4 polymerase treatment for 5 min. at 37° C in a reaction mixture (50 ul) containing the v+i linears, 500 uM each of the 4 dNTPs, and 9 units of T4 polymerase (New England BioLabs), under recommended buffer conditions. After phenol extraction and ethanol precipitation the repaired v+i linears were dissolved in 20 ul TE. The final ligation to produce circles was carried out in a 50 ul reaction containing 5 ul of v+i linears and 5 units of T4 ligase at 14°C overnight. After 10 min. at 70°C the following day, the reaction mixture was stored at -20°C.

This two-stage procedure resulted in a molecularly random collection of single-insert plasmid recombinants with minimal contamination from double-insert chimeras (<1%) or free vector (<3%).

Since deviation from randomness can arise from propagation the DNA in the host, *E.coli* host cells deficient in all recombination and restriction functions (A. Greener, *Strategies* 3 (1):5 (1990)) were used to prevent rearrangements, deletions, and loss of clones by restriction. Furthermore, transformed cells were plated directly on antibiotic diffusion plates to avoid the usual broth recovery phase which allows multiplication and selection of the most rapidly growing cells.

Plating was carried out as follows. A 100 ul aliquot of Epicurian Coli SURE II Supercompetent Cells (Stratagene 200152) was thawed on ice and transferred to a chilled Falcon 2059 tube on ice. A 1.7 ul aliquot of 1.42 M beta-

mercaptoethanol was added to the aliquot of cells to a final concentration of 25 mM. Cells were incubated on ice for 10 min. A 1 µl aliquot of the final ligation was added to the cells and incubated on ice for 30 min. The cells were heat pulsed for 30 sec. at 42° C and placed back on ice for 2 min. The outgrowth period in liquid culture was eliminated from this protocol in order to minimize the preferential growth of any given transformed cell. Instead the transformation mixture was plated directly on a nutrient rich SOB plate containing a 5 ml bottom layer of SOB agar (5% SOB agar: 20 g tryptone, 5 g yeast extract, 0.5 g NaCl, 1.5% Difco Agar per liter of media). The 5 ml bottom layer is supplemented with 0.4 ml of 50 mg/ml ampicillin per 100 ml SOB agar. The 15 ml top layer of SOB agar is supplemented with 1 ml X-Gal (2%), 1 ml MgCl₂ (1 M), and 1 ml MgSO₄/100 ml SOB agar. The 15 ml top layer was poured just prior to plating. Our titer was approximately 100 colonies/10 µl aliquot of transformation.

All colonies were picked for template preparation regardless of size. Thus, only clones lost due to "poison" DNA or deleterious gene products would be deleted from the library, resulting in a slight increase in gap number over that expected.

3. Random DNA Sequencing

High quality double stranded DNA plasmid templates were prepared using an alkaline lysis method developed in collaboration with 5Prime → 3Prime Inc. (Boulder, CO). Plasmid preparation was performed in a 96-well format for all stages of DNA preparation from bacterial growth through final DNA purification. Average template concentration was determined by running 25% of the samples on an agarose gel. DNA concentrations were not adjusted.

Templates were also prepared from a *Staphylococcus aureus* lambda genomic library. An unamplified library was constructed in Lambda DASH II vector (Stratagene). *Staphylococcus aureus* DNA (> 100 kb) was partially digested in a reaction mixture (200 µl) containing 50 µg DNA, 1X Sau3AI buffer, 20 units Sau3AI for 6 min. at 23 C. The digested DNA was phenol-extracted and centrifuges over a 10- 40% sucrose gradient. Fractions containing genomic DNA of 15-25 kb were recovered by precipitation. One µl of fragments was used with 1 µl of DASHII vector (Stratagene) in the recommended ligation reaction. One µl of the ligation mixture was used per packaging reaction following the recommended protocol with the Gigapack II XL Packaging Extract Phage were plated directly without amplification from the packaging mixture (after dilution with 500 µl of recommended SM buffer and chloroform treatment). Yield was about 2.5x10⁹ pfu/µl.

An amplified library was prepared from the primary packaging mixture according to the manufacturer's protocol. The amplified library is stored frozen in 7% dimethylsulfoxide. The phage titer is approximately 1x10⁹ pfu/ml.

Mini-liquid lysates (0.1 µl) are prepared from randomly selected plaques and template is prepared by long range PCR. Samples are PCR amplified using modified T3 and T7 primers, and Elongase Supermix (LT1).

Sequencing reactions are carried out on plasmid templates using a combination of two workstations (BIOMEK 1000 and Hamilton Microlab 2200) and the Perkin-Elmer 9600 thermocycler with Applied Biosystems PRISM Ready Reaction Dye Primer Cycle Sequencing Kits for the M13 forward (M13-21) and the M13 reverse (M13RP1) primers. Dye terminator sequencing reactions are carried out on the lambda templates on a Perkin-Elmer 9600 Thermocycler using the Applied Biosystems Ready Reaction Dye Terminator Cycle Sequencing kits. Modified T7 and T3 primers are used to sequence the ends of the inserts from the Lambda DASH II library. Sequencing reactions are on a combination of AB 373 DNA Sequencers and ABI 377 DNA sequencers. All of the dye terminator sequencing reactions are analyzed using the 2X 9 hour module on the AB 377. Dye primer reactions are analyzed on a combination of ABI 373 and ABI 377 DNA sequencers. The overall sequencing success rate very approximately is about 85% for M13-21 and M13RP1 sequences and 65% for dye-terminator reactions. The average usable read length is 485 bp for M13-21 sequences, 445bp for M13RP1 sequences, and 375 bp for dye-terminator reactions.

4. Protocol for Automated Cycle Sequencing

The sequencing was carried out using Hamilton Microstation 2200, Perkin Elmer 9600 thermocyclers, ABI 373 and ABI 377 Automated DNA Sequencers. The Hamilton combines pre-aliquoted templates and reaction mixes consisting of deoxy- and dideoxynucleotides, the thermostable Taq DNA polymerase, fluorescently-labelled sequencing primers, and reaction buffer. Reaction mixes and templates were combined in the wells of a 96-well thermocycling plate and transferred to the Perkin-Elmer 9600 thermocycler. Thirty consecutive cycles of linear amplification (i.e., one primer synthesis) steps were performed including denaturation, annealing of primer and template, and extension; i.e., DNA synthesis. A heated lid with rubber gaskets on the thermocycling plate prevents evaporation without the need for an oil overlay.

Two sequencing protocols were used: one for dye-labelled primers and a second for dye-labelled dideoxy chain terminators. The shotgun sequencing involves use of four dye-labelled sequencing primers, one for each of the four terminator nucleotide. Each dye-primer was labelled with a different fluorescent dye, permitting the four individual reactions to be combined into one lane of the 373 or 377 DNA Sequencer for electrophoresis, detection, and base-

calling. ABI currently supplies premixed reaction mixes in bulk packages containing all the necessary non-template reagents for sequencing. Sequencing can be done with both plasmid and PCR-generated templates with both dye-primers and dye-terminators with approximately equal fidelity, although plasmid templates generally give longer usable sequences.

Thirty-two reactions were loaded per ABI 373 Sequencer each day and 96 samples can be loaded on an ABI 377 per day. Electrophoresis was run overnight (ABI 373) or for 2 1/2 hours (ABI 377) following the manufacturer's protocols. Following electrophoresis and fluorescence detection, the ABI 373 or ABI 377 performs automatic lane tracking and base-calling. The lane-tracking was confirmed visually. Each sequence electropherogram (or fluorescence lane trace) was inspected visually and assessed for quality. Trailing sequences of low quality were removed and the sequence itself was loaded via software to a Sybase database (archived daily to 8mm tape). Leading vector polylinker sequence was removed automatically by a software program. Average edited lengths of sequences from the standard ABI 373 or ABI 377 were around 400 bp and depend mostly on the quality of the template used for the sequencing reaction.

INFORMATICS

1. Data Management

A number of information management systems for a large-scale sequencing lab have been developed. (For review see, for instance, Kerlavage *et al.*, *Proceedings of the Twenty-Sixth Annual Hawaii International Conference on System Sciences*, IEEE Computer Society Press, Washington D. C., 585 (1993)) The system used to collect and assemble the sequence data was developed using the Sybase relational database management system and was designed to automate data flow wherever possible and to reduce user error. The database stores and correlates all information collected during the entire operation from template preparation to final analysis of the genome. Because the raw output of the ABI 373 Sequencers was based on a Macintosh platform and the data management system chosen was based on a Unix platform, it was necessary to design and implement a variety of multi-user, client-server applications which allow the raw data as well as analysis results to flow seamlessly into the database with a minimum of user effort.

2. Assembly

An assembly engine (TIGR Assembler) developed for the rapid and accurate assembly of thousands of sequence fragments was employed to generate contigs. The TIGR assembler simultaneously clusters and assembles fragments of the genome. In order to obtain the speed necessary to assemble more than 10^4 fragments, the algorithm builds a hash table of 12 bp oligonucleotide subsequences to generate a list of potential sequence fragment overlaps. The number of potential overlaps for each fragment determines which fragments are likely to fall into repetitive elements. Beginning with a single seed sequence fragment, TIGR Assembler extends the current contig by attempting to add the best matching fragment based on oligonucleotide content. The contig and candidate fragment are aligned using a modified version of the Smith-Waterman algorithm which provides for optimal gapped alignments (Waterman, M. S., *Methods in Enzymology* 164: 765 (1988)). The contig is extended by the fragment only if strict criteria for the quality of the match are met. The match criteria include the minimum length of overlap, the maximum length of an unmatched end, and the minimum percentage match. These criteria are automatically lowered by the algorithm in regions of minimal coverage and raised in regions with a possible repetitive element. The number of potential overlaps for each fragment determines which fragments are likely to fall into repetitive elements. Fragments representing the boundaries of repetitive elements and potentially chimeric fragments are often rejected based on partial mismatches at the ends of alignments and excluded from the current contig. TIGR Assembler is designed to take advantage of clone size information coupled with sequencing from both ends of each template. It enforces the constraint that sequence fragments from two ends of the same template point toward one another in the contig and are located within a certain range of base pairs (definable for each clone based on the known clone size range for a given library).

3. Identifying Genes

The predicted coding regions of the *Staphylococcus aureus* genome were initially defined with the program zorf, which finds ORFs of a minimum length. The predicted coding region sequences were used in searches against a database of all *Staphylococcus aureus* nucleotide sequences from GenBank (release 92.0), using the BLASTN search method to identify overlaps of 50 or more nucleotides with at least a 95% identity. Those ORFs with nucleotide sequence matches are shown in Table 1. The ORFs without such matches were translated to protein sequences and compared to a non-redundant database of known proteins generated by combining the Swiss-prot, PIR and GenPept databases. ORFs of at least 80 amino acids that matched a database protein with BLASTP probability less than or equal to 0.01 are shown in Table 2. The table also lists assigned functions based on the closest match in the databases.

ORFs of at least 120 amino acids that did not match protein or nucleotide sequences in the databases at these levels are shown in Table 3.

ILLUSTRATIVE APPLICATIONS

1. Production of an Antibody to a *Staphylococcus aureus* Protein

Substantially pure protein or polypeptide is isolated from the transfected or transformed cells using any one of the methods known in the art. The protein can also be produced in a recombinant prokaryotic expression system, such as *E. coli*, or can be chemically synthesized. Concentration of protein in the final preparation is adjusted, for example, by concentration on an Amicon filter device, to the level of a few micrograms/ml. Monoclonal or polyclonal antibody to the protein can then be prepared as follows.

2. Monoclonal Antibody Production by Hybridoma Fusion

Monoclonal antibody to epitopes of any of the peptides identified and isolated as described can be prepared from murine hybridomas according to the classical method of Kohler, G. and Milstein, C., *Nature* 256:495 (1975) or modifications of the methods thereof. Briefly, a mouse is repetitively inoculated with a few micrograms of the selected protein over a period of a few weeks. The mouse is then sacrificed, and the antibody producing cells of the spleen isolated. The spleen cells are fused by means of polyethylene glycol with mouse myeloma cells, and the excess unfused cells destroyed by growth of the system on selective media comprising aminopterin (HAT media). The successfully fused cells are diluted and aliquots of the dilution placed in wells of a microtiter plate where growth of the culture is continued. Antibody-producing clones are identified by detection of antibody in the supernatant fluid of the wells by immunoassay procedures, such as ELISA, as originally described by Engvall, E., *Meth. Enzymol.* 70:419 (1980), and modified methods thereof. Selected positive clones can be expanded and their monoclonal antibody product harvested for use. Detailed procedures for monoclonal antibody production are described in Davis, L. *et al.* *Basic Methods in Molecular Biology* Elsevier, New York. Section 21-2 (1989).

3. Polyclonal Antibody Production by Immunization

Polyclonal antiserum containing antibodies to heterogenous epitopes of a single protein can be prepared by immunizing suitable animals with the expressed protein described above, which can be unmodified or modified to enhance immunogenicity. Effective polyclonal antibody production is affected by many factors related both to the antigen and the host species. For example, small molecules tend to be less immunogenic than other and may require the use of carriers and adjuvant. Also, host animals vary in response to site of inoculations and dose, with both inadequate or excessive doses of antigen resulting in low titer antisera. Small doses (ng level) of antigen administered at multiple intradermal sites appears to be most reliable. An effective immunization protocol for rabbits can be found in Vaitukaitis, J. *et al.*, *J. Clin. Endocrinol. Metab.* 33:988-991 (1971).

Booster injections can be given at regular intervals, and antiserum harvested when antibody titer thereof, as determined semi-quantitatively, for example, by double immunodiffusion in agar against known concentrations of the antigen, begins to fall. See, for example, Ouchterlony, O. *et al.*, Chap. 19 in: *Handbook of Experimental Immunology*, Wier, D., ed, Blackwell (1973). Plateau concentration of antibody is usually in the range of 0.1 to 0.2 mg/ml of serum (about 12M). Affinity of the antisera for the antigen is determined by preparing competitive binding curves, as described, for example, by Fisher, D., Chap. 42 in: *Manual of Clinical Immunology*, second edition, Rose and Friedman, eds., Amer. Soc. For Microbiology, Washington, D. C. (1980).

Antibody preparations prepared according to either protocol are useful in quantitative immunoassays which determine concentrations of antigen-bearing substances in biological samples; they are also used semi-quantitatively or qualitatively to identify the presence of antigen in a biological sample. In addition, they are useful in various animal models of *Staphylococcal* disease known to those of skill in the art as a means of evaluating the protein used to make the antibody as a potential vaccine target or as a means of evaluating the antibody as a potential immunotherapeutic reagent.

3. Preparation of PCR Primers and Amplification of DNA

Various fragments of the *Staphylococcus aureus* genome, such as those of Tables 1-3 and SEQ ID NOS: 1-5, 191 can be used, in accordance with the present invention, to prepare PCR primers for a variety of uses. The PCR primers are preferably at least 15 bases, and more preferably at least 18 bases in length. When selecting a primer sequence, it is preferred that the primer pairs have approximately the same G/C ratio, so that melting temperatures are approxi-

mately the same. The PCR primers and amplified DNA of this Example find use in the Examples that follow.

4. Gene expression from DNA Sequences Corresponding to ORFs

A fragment of the *Staphylococcus aureus* genome provided in Tables 1-3 is introduced into an expression vector using conventional technology. Techniques to transfer cloned sequences into expression vectors that direct protein translation in mammalian, yeast, insect or bacterial expression systems are well known in the art. Commercially available vectors and expression systems are available from a variety of suppliers including Stratagene (La Jolla, California), Promega (Madison, Wisconsin), and Invitrogen (San Diego, California). If desired, to enhance expression and facilitate proper protein folding, the codon context and codon pairing of the sequence may be optimized for the particular expression organism, as explained by Hatfield *et al.*, U. S. Patent No. 5,082,767, incorporated herein by this reference.

The following is provided as one exemplary method to generate polypeptide(s) from cloned ORFs of the *Staphylococcus aureus* genome fragment. Bacterial ORFs generally lack a poly A addition signal. The addition signal sequence can be added to the construct by, for example, splicing out the poly A addition sequence from pSG5 (Stratagene) using BglII and Sall restriction endonuclease enzymes and incorporating it into the mammalian expression vector pXT1 (Stratagene) for use in eukaryotic expression systems. pXT1 contains the LTRs and a portion of the gag gene of Moloney Murine Leukemia Virus. The positions of the LTRs in the construct allow efficient stable transfection. The vector includes the Herpes Simplex thymidine kinase promoter and the selectable neomycin gene. The *Staphylococcus aureus* DNA is obtained by PCR from the bacterial vector using oligonucleotide primers complementary to the *Staphylococcus aureus* DNA and containing restriction endonuclease sequences for PstI incorporated into the 5' primer and BglII at the 3' end of the corresponding *Staphylococcus aureus* DNA 3' primer, taking care to ensure that the *Staphylococcus aureus* DNA is positioned such that its followed with the poly A addition sequence. The purified fragment obtained from the resulting PCR reaction is digested with PstI, blunt ended with an exonuclease, digested with BglII, purified and ligated to pXT1, now containing a poly A addition sequence and digested BglII.

The ligated product is transfected into mouse NIH 3T3 cells using Lipofectin (Life Technologies, Inc., Grand Island, New York) under conditions outlined in the product specification. Positive transfectants are selected after growing the transfected cells in 600 ug/ml G418 (Sigma, St. Louis, Missouri). The protein is preferably released into the supernatant. However if the protein has membrane binding domains, the protein may additionally be retained within the cell or expression may be restricted to the cell surface. Since it may be necessary to purify and locate the transfected product, synthetic 15-mer peptides synthesized from the predicted *Staphylococcus aureus* DNA sequence are injected into mice to generate antibody to the polypeptide encoded by the *Staphylococcus aureus* DNA.

Alternatively and if antibody production is not possible, the *Staphylococcus aureus* DNA sequence is additionally incorporated into eukaryotic expression vectors and expressed as, for example, a globin fusion. Antibody to the globin moiety then is used to purify the chimeric protein. Corresponding protease cleavage sites are engineered between the globin moiety and the polypeptide encoded by the *Staphylococcus aureus* DNA so that the latter may be freed from the formed by simple protease digestion. One useful expression vector for generating globin chimerics is pSG5 (Stratagene). This vector encodes a rabbit globin. Intron II of the rabbit globin gene facilitates splicing of the expressed transcript, and the polyadenylation signal incorporated into the construct increases the level of expression. These techniques are well known to those skilled in the art of molecular biology. Standard methods are published in methods texts such as Davis *et al.*, cited elsewhere herein, and many of the methods are available from the technical assistance representatives from Stratagene, Life Technologies, Inc., or Promega. Polypeptides of the invention also may be produced using *in vitro* translation systems such as *in vitro* ExpressTM Translation Kit (Stratagene).

While the present invention has been described in some detail for purposes of clarity and understanding, one skilled in the art will appreciate that various changes in form and detail can be made without departing from the true scope of the invention.

All patents, patent applications and publications referred to above are hereby incorporated by reference.

S. aureus - Coding regions containing known sequences

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	percent Ident	HSP nt length	ORF nt length
1	1	1419	757	[emb]X17J01	S.aureus DNA for hld gene and for part of agr gene	100	663	663
1	2	3273	2452	[emb]X52543	S.aureus agrA, agrB and hld genes	99	809	822
1	5	6418	5651	[dbj]D14711	Staphylococcus aureus HSP10 and HSP60 genes	98	223	768
5	1	807	439	[emb]X72700	S.aureus genes for S and F components of Panton-Valentine leucocidins	81	216	369
5	4	5031	3571	[emb]X72700	S.aureus genes for S and F components of Panton-Valentine leucocidins	95	424	1461
10	1	86	904	[gb]U25288	Staphylococcus aureus gyrase-like protein alpha and beta subunit (gria and grlb) genes, complete cds	98	715	819
16	5	5302	6246	[gb]U35773	Staphylococcus aureus prolipoprotein diacylglycerol transferase (lgt) gene, complete cds	94	251	945
16	6	6249	7091	[gb]U35773	Staphylococcus aureus prolipoprotein diacylglycerol transferase (lgt) gene, complete cds	99	843	843
16	7	7084	7584	[gb]U35773	Staphylococcus aureus prolipoprotein diacylglycerol transferase (lgt) gene, complete cds	99	342	501
20	1	995	549	[gb]U19300	Staphylococcus aureus DNA sequence encoding three ORFs, complete cds; prophage phi-11 sequence homology, 5' flank	100	443	447
20	2	1011	841	[gb]U19300	Staphylococcus aureus DNA sequence encoding three ORFs, complete cds; prophage phi-11 sequence homology, 5' flank	91	137	171
20	3	2010	1798	[gb]U19300	Staphylococcus aureus DNA sequence encoding three ORFs, complete cds; prophage phi-11 sequence homology, 5' flank	100	110	213
20	4	5300	3825	[gb]U16714	Staphylococcus aureus peptidoglycan hydrolase gene, complete cds	100	948	1476
20	5	4788	4282	[gb]U16714	Staphylococcus aureus peptidoglycan hydrolase gene, complete cds	100	309	507
26	1	2	145	[gb]U41072	Staphylococcus aureus isoleucyl-tRNA synthetase (lles) gene, partial cds	100	126	144
26	2	84	557	[gb]U41072	Staphylococcus aureus isoleucyl-tRNA synthetase (lles) gene, partial cds	99	430	474
26	3	763	3531	[emb]X74219	S.aureus gene for isoleucyl-tRNA synthetase	99	2769	2769
29	3	1261	4392	[gb]U66665	Staphylococcus aureus DNA fragment with class II promoter activity	100	117	3132
31	14	114977	13463	[emb]X73889	S.aureus genes p1 and p2	99	1351	1515
31	15	114241	13855	[emb]X73889	S.aureus genes p1 and p2	98	258	387
38	17	114284	13112	[gb]U12715	S.aureus gdh gene encoding lipase (glycerol ester hydrolase)	100	372	1173
38	19	13434	15518	[gb]U12715	S.aureus gdh gene encoding lipase (glycerol ester hydrolase)	100	2085	2085

TABLE I

S. aureus - Coding regions containing known sequences

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	percent ident	HSP nt length	ORF nt length
46	2	519	1727	[gb U73374]	Staphylococcus aureus type 8 capsule genes, cap8A, cap8B, cap8C, cap8D, cap8E, cap8F, cap8G, cap8H, cap8I, cap8J, cap8K, cap8L, cap8M, cap8N, cap8O, cap8P, complete cds	98	1209	1209
46	3	1720	2295	[gb U73374]	Staphylococcus aureus type 8 capsule genes, cap8A, cap8B, cap8C, cap8D, cap8E, cap8F, cap8G, cap8H, cap8I, cap8J, cap8K, cap8L, cap8M, cap8N, cap8O, cap8P, complete cds	98	576	576
46	4	2259	3182	[gb U73374]	Staphylococcus aureus type 8 capsule genes, cap8A, cap8B, cap8C, cap8D, cap8E, cap8F, cap8G, cap8H, cap8I, cap8J, cap8K, cap8L, cap8M, cap8N, cap8O, cap8P, complete cds	97	924	924
46	5	3173	4498	[gb U73374]	Staphylococcus aureus type 8 capsule genes, cap8A, cap8B, cap8C, cap8D, cap8E, cap8F, cap8G, cap8H, cap8I, cap8J, cap8K, cap8L, cap8M, cap8N, cap8O, cap8P, complete cds	98	1283	1326
46	6	4536	5720	[gb U73374]	Staphylococcus aureus type 8 capsule genes, cap8A, cap8B, cap8C, cap8D, cap8E, cap8F, cap8G, cap8H, cap8I, cap8J, cap8K, cap8L, cap8M, cap8N, cap8O, cap8P, complete cds	98	1185	1185
46	7	6455	6120	[gb U73374]	Staphylococcus aureus type 8 capsule genes, cap8A, cap8B, cap8C, cap8D, cap8E, cap8F, cap8G, cap8H, cap8I, cap8J, cap8K, cap8L, cap8M, cap8N, cap8O, cap8P, complete cds	99	278	336
48	1	2	955	[gb U25893]	Staphylococcus aureus recA gene, complete cds	99	954	954
50	3	4465	2924	[emb X85029 SAHI]	S. aureus AhpC gene	100	88	1542
50	4	4108	3515	[emb X85029 SAHI]	S. aureus AhpC gene	98	540	590
54	3	5074	3392	[emb X62992 SAFN]	S. aureus fnbB gene for fibronectin binding protein 8	100	1668	1683
54	4	4865	4122	[emb X62992 SAFN]	S. aureus fnbB gene for fibronectin binding protein 8	99	720	744
54	5	5056	4562	[emb X62992 SAFN]	S. aureus fnbB gene for fibronectin binding protein 8	100	463	495
54	6	11386	8300	[gb J04151]	S. aureus fibronectin-binding protein (fnbA) mRNA, complete cds	100	3087	3087
58	3	1743	2819	[emb X87104 SADN]	S. aureus mdr, pbp4 and tagD genes (SGS11-55 isolate)	89	68	1077
58	4	2858	3280	[emb X91786 SAPB]	S. aureus abca, pbp4, and tagD genes	99	423	423
58	5	6005	4701	[emb X91786 SAPB]	S. aureus abca, pbp4, and tagD genes	99	1305	1305
58	6	5677	5378	[gb U29478]	Staphylococcus aureus ABC transporter-like protein Abca (abca) gene, partial cds	100	300	300
58	7	5086	6840	[emb X91786 SAPB]	S. aureus abca, pbp4, and tagD genes	99	1755	1755
72	1	888	445	[gb U21854]	S. aureus agr gene encoding an accessory gene regulator protein, complete cds	100	444	444
72	2	2457	1453	[emb X52543 SAG]	S. aureus agrA, agrB and hid genes	99	673	1005

TABLE 1

S. aureus - Coding regions containing known sequences

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	Percent ident	HSP nt length	ORF nt length
82	1	357	3917	emb X64172 SARP	S.aureus rplL, orf202, rpoB(rpl) and rpoC genes for ribosomal protein L7/L12, hypothetical protein ORF202, DNA-directed RNA polymerase beta & beta' chains	99	2396	3561
82	2	4027	7677	emb X69233 SARP	S.aureus DNA for rpoC gene	99	3171	3651
82	3	7745	8068	gb U20869	Staphylococcus aureus ribosomal protein S12 (rpsL) gene, complete cds, ribosomal protein S7 (rpsG) and ORF 1 genes, partial cds	100	320	324
82	4	8103	8579	gb U20869	Staphylococcus aureus ribosomal protein S12 (rpsL) gene, complete cds, ribosomal protein S7 (rpsG) and ORF 1 genes, partial cds	100	477	477
82	5	8618	8871	gb U20869	Staphylococcus aureus ribosomal protein S12 (rpsL) gene, complete cds, ribosomal protein S7 (rpsG) and ORF 1 genes, partial cds	100	134	204
84	1	18	191	gb U73374	Staphylococcus aureus type 8 capsule genes, cap8A, cap8B, cap8C, cap8D, cap8E, cap8F, cap8G, cap8H, cap8I, cap8J, cap8K, cap8L, cap8M, cap8N, cap8O, cap8P, complete cds	98	164	174
84	2	189	893	gb U73374	Staphylococcus aureus type 8 capsule genes, cap8A, cap8B, cap8C, cap8D, cap8E, cap8F, cap8G, cap8H, cap8I, cap8J, cap8K, cap8L, cap8M, cap8N, cap8O, cap8P, complete cds	94	705	705
84	3	887	1660	gb U73374	Staphylococcus aureus type 8 capsule genes, cap8A, cap8B, cap8C, cap8D, cap8E, cap8F, cap8G, cap8H, cap8I, cap8J, cap8K, cap8L, cap8M, cap8N, cap8O, cap8P, complete cds	99	774	774
84	4	1584	3503	gb U73374	Staphylococcus aureus type 8 capsule genes, cap8A, cap8B, cap8C, cap8D, cap8E, cap8F, cap8G, cap8H, cap8I, cap8J, cap8K, cap8L, cap8M, cap8N, cap8O, cap8P, complete cds	98	1920	1920
84	5	3394	4521	gb U73374	Staphylococcus aureus type 8 capsule genes, cap8A, cap8B, cap8C, cap8D, cap8E, cap8F, cap8G, cap8H, cap8I, cap8J, cap8K, cap8L, cap8M, cap8N, cap8O, cap8P, complete cds	97	1128	1128
84	6	4519	5643	gb U73374	Staphylococcus aureus type 8 capsule genes, cap8A, cap8B, cap8C, cap8D, cap8E, cap8F, cap8G, cap8H, cap8I, cap8J, cap8K, cap8L, cap8M, cap8N, cap8O, cap8P, complete cds	97	1125	1125
96	2	1245	3836	emb Z18852 ISACF	S.aureus gene for clumping factor	83	660	2652
97	2	625	882	gb U41072	Staphylococcus aureus isoleucyl-tRNA synthetase (iles) gene, partial cds	97	68	258
111	1	3	452	gb L41499	Staphylococcus aureus ORF1, partial cds, ORF2, ORF3, autolysin (atl) genes, complete cds	100	450	450
111	2	526	1041	gb L41499	Staphylococcus aureus ORF1, partial cds, ORF2, ORF3, autolysin (atl) genes, complete cds	99	516	516
117	2	1278	1958	gb H83994	Staphylococcus aureus prolipoprotein signal peptidase (lsp) gene, complete cds	100	61	681

TABLE 1

S. aureus - Coding regions containing known sequences

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	percent ident	HSP nt length	ORF nt length
118	4	3787	4254	[dbj U00690 STAN]	Staphylococcus aureus multi-resistance plasmid pSKI DNA containing cds	99	467	468
130	4	2597	3640	[emb X13290 SATN]	Staphylococcus aureus multi-resistance plasmid pSKI DNA containing Transposon Tn1003	78	956	1044
130	5	3813	4265	[emb Z16422 SAOI]	S. aureus dfrB gene for dihydrofolate reductase	98	416	433
130	6	4309	5172	[emb Z16422 SAOI]	S. aureus dfrB gene for dihydrofolate reductase	98	607	864
136	4	5256	6207	[emb X71437 SAGV]	S. aureus genes gyrB, gyrA and recF (partial)	97	838	912
136	5	11680	8987	[dbj U010489 STAG]	Staphylococcus aureus genes for DNA gyrase A and B, complete cds	100	2694	2694
136	6	12886	10940	[dbj U010489 STAG]	Staphylococcus aureus genes for DNA gyrase A and B, complete cds	99	1947	1947
136	7	12592	11765	[gb S77055]	recF cluster: dnaA-replisome assembly protein...gyrB-DNA gyrase beta subunit [Staphylococcus aureus, Y8886, Genomic, 5 genes, 3573 nt]	99	822	828
143	3	4171	2867	[gb U36379]	Staphylococcus aureus S-adenosylmethionine synthetase gene, complete cds	99	1305	1305
143	4	3100	4281	[gb L42943]	Staphylococcus aureus (clone KIN50) phosphoenolpyruvate carboxykinase (pckA) gene, complete cds	100	1170	1182
143	5	4254	4718	[gb U51133]	Staphylococcus aureus phosphoenolpyruvate carboxykinase (pckA) gene, complete cds	100	449	465
143	9	6977	7261	[gb U51132]	Staphylococcus aureus o-succinylbenzoic acid CoA ligase (menE), and o-succinylbenzoic acid synthetase (menC) genes, complete cds	100	75	285
143	10	9464	8361	[gb U51132]	Staphylococcus aureus o-succinylbenzoic acid CoA ligase (menE), and o-succinylbenzoic acid synthetase (menC) genes, complete cds	100	1104	1104
143	11	11232	9748	[gb U51132]	Staphylococcus aureus o-succinylbenzoic acid CoA ligase (menE), and o-succinylbenzoic acid synthetase (menC) genes, complete cds	100	1485	1485
143	12	10739	10320	[gb U51132]	Staphylococcus aureus o-succinylbenzoic acid CoA ligase (menE), and o-succinylbenzoic acid synthetase (menC) genes, complete cds	100	332	420
152	5	2454	3437	[emb X58434 SAPD]	S. aureus pdhA, pdhC and pdhD genes for pyruvate decarboxylase, dihydroliipoamide acetyltransferase and dihydroliipoamide dehydrogenase	99	305	984
152	6	3513	4820	[emb X58434 SAPD]	S. aureus pdhB, pdhC and pdhD genes for pyruvate decarboxylase, dihydroliipoamide acetyltransferase and dihydroliipoamide dehydrogenase	98	1308	1308
152	7	4818	6230	[emb X58434 SAPD]	S. aureus pdhE, pdhC and pdhD genes for pyruvate decarboxylase, dihydroliipoamide acetyltransferase and dihydroliipoamide dehydrogenase	99	1413	1413
153	1	387	1526	[gb S77055]	recF cluster: dnaA-replisome assembly protein...gyrB-DNA gyrase beta subunit [Staphylococcus aureus, Y8886, Genomic, 5 genes, 3573 nt]	99	1140	1140
153	2	1877	2152	[gb S77055]	recF cluster: dnaA-replisome assembly protein...gyrB-DNA gyrase beta subunit [Staphylococcus aureus, Y8886, Genomic, 5 genes, 3573 nt]	100	276	276

TABLE I

S. aureus - Coding regions containing known sequences

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	Percent ident	USP nt length	ORF nt length
153	3	2143	2289	[gb S77055]	ref cluster: dnaA-replisome assembly protein...gyrB-DNA gyrase beta subunit [Staphylococcus aureus, Y8886, Genomic, 5 genes, 3573 nt]	99	113	147
154	10	10792	9314	[gb U06451]	[Staphylococcus aureus proline permease homolog (putP) gene, complete cds]	91	154	1479
154	11	9935	9615	[gb U06451]	[Staphylococcus aureus proline permease homolog (putP) gene, complete cds]	99	229	321
154	12	9943	10167	[gb U06451]	[Staphylococcus aureus proline permease homolog (putP) gene, complete cds]	94	123	225
154	13	10089	11501	[gb U06451]	[Staphylococcus aureus proline permease homolog (putP) gene, complete cds]	99	1326	1413
159	2	2195	1212	[dbj D24879]	[STAP Staphylococcus aureus gene for penicillin-binding protein 1, complete cds]	100	71	984
161	3	2596	2270	[gb M83994]	[Staphylococcus aureus prolipoprotein signal peptidase (lsp) gene, complete cds]	92	203	327
162	1	1406	705	[gb U21221]	[Staphylococcus aureus hyaluronate lyase (hysA) gene, complete cds]	100	702	702
163	4	1263	1772	[gb U19770]	[Staphylococcus aureus pyrrolidone carboxyl peptidase (pcp) gene, complete cds]	96	127	510
164	7	4774	9117	[dbj D85727]	[D867 Staphylococcus aureus DNA for DNA polymerase III, complete cds]	99	3470	4344
168	7	7448	6447	[gb U21636]	[Staphylococcus aureus cnp-binding-factor 1 (cbf1) and ORF X genes, complete cds]	100	1002	1002
168	8	9538	7961	[gb U21636]	[Staphylococcus aureus cnp-binding-factor 1 (cbf1) and ORF X genes, complete cds]	99	1158	1578
173	6	9240	7801	[gb J03479]	[S. aureus enzyme III-lac (lacF), enzyme II-lac (lacE), and phospho-beta-galactosidase (lacG) genes, complete cds]	100	1440	1440
173	7	11252	9522	[gb J03479]	[S. aureus enzyme III-lac (lacF), enzyme II-lac (lacE), and phospho-beta-galactosidase (lacG) genes, complete cds]	99	1731	1731
173	8	8285	8704	[gb J03479]	[S. aureus enzyme III-lac (lacF), enzyme II-lac (lacE), and phospho-beta-galactosidase (lacG) genes, complete cds]	100	420	420
173	9	10168	9839	[gb J03479]	[S. aureus enzyme III-lac (lacF), enzyme II-lac (lacE), and phospho-beta-galactosidase (lacG) genes, complete cds]	100	330	330
173	10	11815	10829	[emb X14827]	[SALA Staphylococcus aureus lacC and lacD genes]	100	987	987
173	11	12721	11174	[emb X14827]	[SALA Staphylococcus aureus lacC and lacD genes]	100	948	948
173	12	12838	12305	[gb M64724]	[S. aureus tagatose 6-phosphate isomerase gene, complete cds]	100	534	534
173	13	13243	12773	[gb M32103]	[Staphylococcus aureus lac repressor (lacR) gene, complete cds and lacA repressor (lacA), partial cds]	100	471	471
173	14	114633	113866	[gb M32103]	[Staphylococcus aureus lac repressor (lacR) gene, complete cds and lacA repressor (lacA), partial cds]	100	768	768

TABLE 1

S. aureus - Coding regions containing known sequences

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	Percent ident	HSP nt length	ORF nt length
178	1	2	655	gb U52961	Staphylococcus aureus holin-like protein LrgA (lrgA) and LrgB (lrgB) genes, complete cds	100	115	654
178	2	2201	1482	gb U52961	Staphylococcus aureus holin-like protein LrgA (lrgA) and LrgB (lrgB) genes, complete cds	100	720	720
178	3	2361	1909	gb U52961	Staphylococcus aureus holin-like protein LrgA (lrgA) and LrgB (lrgB) genes, complete cds	100	453	453
178	4	1551	1853	gb U52961	Staphylococcus aureus holin-like protein LrgA (lrgA) and LrgB (lrgB) genes, complete cds	100	303	303
178	5	3541	2777	gb U42945	Staphylococcus aureus lysis and lysis genes, complete cds	99	765	765
178	6	3294	3025	gb U42945	Staphylococcus aureus lysis and lysis genes, complete cds	99	270	270
181	1	1114	590	gb H61177	S.aureus sigma factor (plac) gene, complete cds	99	439	525
182	1	3	341	emb X61307 SASP	Staphylococcus aureus spa gene for protein A	98	277	339
182	2	690	2312	gb J01786	S.aureus spa gene coding for protein A, complete cds	97	1332	1623
182	3	5861	4251	emb X61307 SASP	Staphylococcus aureus spa gene for protein A	99	119	1611
185	1	3	824	gb J01979	Staphylococcus aureus chorismate synthase (aroC) and nucleoside diphosphate kinase (ndk) genes, complete cds, dehydroquinase synthase (aroB) and geranylgeranyl pyrophosphate synthase homolog (gerCC) genes, partial cds	90	132	822
191	3	841	2760	emb X17679 SACO	Staphylococcus aureus coa gene for coagulase	99	1920	1920
191	4	2967	3143	emb X16457 SAST	Staphylococcus aureus gene for staphylocoagulase	99	177	177
191	5	5768	4566	emb X16457 SAST	Staphylococcus aureus gene for staphylocoagulase	99	250	1203
196	1	1741	872	gb J36472	Staphylococcus aureus lysyl-tRNA synthetase gene, complete cds, transfer RNA (tRNA) genes, 5S ribosomal RNA (5S rRNA) gene, 16S ribosomal RNA (16S rRNA) gene, 23S ribosomal RNA (23S rRNA) gene	99	870	870
198	3	1688	2011	emb X92205 SAPT	S.aureus psm and pta1 genes	99	324	324
198	4	2005	2310	emb X92205 SAPT	S.aureus pta1 and pta1 genes	97	304	306
202	1	163	1305	emb X97985 SA12	S.aureus orfs 1, 2, 3 & 4	99	1143	1143
202	2	1303	2175	emb X73889 SAP1	S.aureus genes P1 and P2	94	444	873
210	1	3114	1558	dbj D17366 STAA	Staphylococcus aureus atl gene for autolysin, complete cds and other ORFs	99	1552	1557
210	2	2939	2232	gb L41498	Staphylococcus aureus ORF1, partial cds, ORF2, ORF3, autolysin (atl) genes, complete cds	99	684	708
214	11	7429	7770	dbj D86240 D862	Staphylococcus aureus gene for unknown function and dit operon dltA, dltB, dltC and dltD genes, complete cds	96	157	342

TABLE 1

S. aureus - Coding regions containing known sequences

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	Percent ident	HSP nt length	ORF nt length
216	3	398	1318	emb X72700 SAPV	S. aureus genes for S and F components of Pantone-Valentine leucocidins	88	265	921
219	2	1810	1073	dbj D30690 STAN	Staphylococcus aureus genes for ORF37, HSP20, HSP70, HSP40, ORF35, complete cds	100	60	718
219	3	2973	2035	dbj D30690 STAN	Staphylococcus aureus genes for ORF37, HSP20, HSP70, HSP40, ORF35, complete cds	99	945	945
219	4	4159	3196	dbj D30690 STAN	Staphylococcus aureus genes for ORF37, HSP20, HSP70, HSP40, ORF35, complete cds	99	1164	1164
219	5	7044	1176	dbj D30690 STAN	Staphylococcus aureus genes for ORF37, HSP20, HSP70, HSP40, ORF35, complete cds	98	1869	1869
219	6	6557	5883	dbj D30690 STAN	Staphylococcus aureus genes for ORF37, HSP20, HSP70, HSP40, ORF35, complete cds	99	675	675
219	7	6801	6334	dbj D30690 STAN	Staphylococcus aureus genes for ORF37, HSP20, HSP70, HSP40, ORF35, complete cds	98	468	468
221	8	10816	10034	gb U19298	Staphylococcus aureus phosphatidylinositol-specific phospholipase C (plc) gene, complete cds	91	67	783
223	1	2855	1506	gb U73374	Staphylococcus aureus type 8 capsule genes, cap8A, cap8B, cap8C, cap8D, cap8E, cap8F, cap8G, cap8H, cap8I, cap8J, cap8K, cap8L, cap8M, cap8N, cap8O, cap8P, complete cds	99	102	1350
234	1	2	1357	emb X97985 SA12	S. aureus orfs 1,2,3 & 4	100	176	1356
234	2	1694	2485	emb X97985 SA12	S. aureus orfs 1,2,3 & 4	100	792	792
234	3	2648	3148	emb X97985 SA12	S. aureus orfs 1,2,3 & 4	99	501	501
234	4	3120	4604	emb X97985 SA12	S. aureus orfs 1,2,3 & 4	99	1305	1485
236	6	3826	5322	gb U48826	Staphylococcus aureus elastin binding protein (ebpS) gene, complete cds	96	648	1497
248	1	2	403	emb X62288 SAPE	S. aureus DNA for penicillin-binding protein 2	100	103	402
248	2	388	852	gb U35426	Staphylococcus aureus penicillin-binding protein 2 (pbp2) gene, complete cds	99	465	465
253	2	1539	1093	gb U46541	Staphylococcus aureus sara gene, complete cds	96	447	447
254	2	150	1835	gb U57060	Staphylococcus aureus scdA gene, complete cds	94	142	1686
254	3	1973	2728	gb U57060	Staphylococcus aureus scdA gene, complete cds	99	756	756
260	1	2	1900	gb U90693	Staphylococcus aureus glycerol ester hydrolase (lip) gene, complete cds	99	1213	1899
265	1	1	942	db D21131 STAS	Staphylococcus aureus gene for a participant in homogeneous expression of high-level methicillin resistance, complete cds	99	941	942

TABLE I

S. aureus - Coding regions containing known sequences

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	patch gene name	percent ident	HSP nt length	ORF nt length
265	2	688	476	[dbj D211131 STAS	[Staphylococcus aureus gene for a participant in homogeneous expression of high-level methicillin resistance, complete cds	99	213	213
265	3	2418	1765	[dbj D211131 STAS	[Staphylococcus aureus gene for a participant in homogeneous expression of high-level methicillin resistance, complete cds	98	69	654
266	1	2	1018	[dbj D147111 STAH	[Staphylococcus aureus HSP10 and HSP60 genes	98	743	1017
282	1	1	525	[gb F72488	[hemB-porphobilinogen synthase (Staphylococcus aureus, SA1959, Genomic, 1087 nt)	100	110	525
282	2	516	1502	[gb S72488	[hemB-porphobilinogen synthase (Staphylococcus aureus, SA1959, Genomic, 1087 nt)	100	952	987
284	1	3	170	[gb M63176	[Staphylococcus aureus helicase required for T181 replication (pcrA) gene, complete cds	98	84	168
284	2	282	1034	[gb M63176	[Staphylococcus aureus helicase required for T181 replication (pcrA) gene, complete cds	100	712	753
284	3	1028	2026	[gb M63176	[Staphylococcus aureus helicase required for T181 replication (pcrA) gene, complete cds	99	979	999
284	4	1990	2202	[gb M63176	[Staphylococcus aureus helicase required for T181 replication (pcrA) gene, complete cds	98	187	213
289	3	1536	1991	[gb M32470	[S. aureus SauJAI-restriction-enzyme and SauJAI-modification-enzyme genes, complete cds	99	338	456
303	1	2	868	[gb L01055	[Staphylococcus aureus gamma-hemolysin components A, B and C (hlgA, hlgB, hlgC) genes, complete cds	99	867	867
303	2	1409	2383	[gb L01055	[Staphylococcus aureus gamma-hemolysin components A, B and C (hlgA, hlgB, hlgC) genes, complete cds	100	975	975
303	3	2367	3161	[gb L01055	[Staphylococcus aureus gamma-hemolysin components A, B and C (hlgA, hlgB, hlgC) genes, complete cds	99	793	795
305	1	2707	1355	[dbj D17366 STAA	[Staphylococcus aureus atl gene for autolysin, complete cds and other ORFs	99	1343	1353
311	1	2628	1315	[gb L42945	[Staphylococcus aureus lysS and lysR genes, complete cds	98	1314	1314
312	6	7019	7870	[gb J24017	[Staphylococcus aureus methicillin-resistance protein (mecR) gene and unknown ORF, complete cds	74	351	852
323	1	1998	1003	[gb U31175	[Staphylococcus aureus D-specific D-2-hydroxyacid dehydrogenase (adh) gene, complete cds	98	996	996
326	1	1	237	[emb Y00356 SASP	[Staphylococcus aureus V8 serine protease gene	100	108	237
338	1	687	368	[emb X64389 SALE	[S. aureus leuP-P83 gene for F component of leucocidin R	98	259	300
338	2	1828	1086	[emb X64389 SALE	[S. aureus leuP-P83 gene for F component of leucocidin R	97	137	741

TABLE 1

S. aureus - Coding regions containing known sequences

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	percent ident	HSP nt length	ORF nt length
342	2	579	1754	[gb U06462]	[Staphylococcus aureus SA4 FtsZ (ftsZ) gene, complete cds	100	1176	1176
344	2	517	1248	[emb V01281 SANTU	[S. aureus mRNA for nuclease	98	732	732
349	1	457	210	[gb H20393]	[S. aureus bacteriophage phi-11 attachment site (attCB)	96	172	228
353	1	1016	516	[gb H03994]	[Staphylococcus aureus prolipoprotein signal peptidase (lsp) gene, complete cds	100	187	501
355	2	1582	1046	[gb H03994]	[Staphylococcus aureus prolipoprotein signal peptidase (lsp) gene, complete cds	99	537	537
356	1	3	674	[gb U20503]	[Staphylococcus aureus MHC class II analog gene, complete cds	75	671	672
361	1	1	903	[gb U19298]	[Staphylococcus aureus phosphatidylinositol-specific phospholipase C (plc) gene, complete cds	98	747	903
361	2	1103	1507	[gb U19298]	[Staphylococcus aureus phosphatidylinositol-specific phospholipase C (plc) gene, complete cds	97	68	405
373	1	3	1148	[emb X62288 SAPE	[S. aureus DNA for penicillin-binding protein 2	99	1146	1146
389	3	1904	1248	[emb X62282 SATS	[S. aureus target site DNA for IS431 insertion	97	349	657
400	1	1	540	[emb X61716 SAML	[S. aureus hlb gene encoding sphingomyelinase	99	389	540
400	2	1693	1187	[emb X13404 SAML	[Staphylococcus aureus hlb gene for beta-hemolysin	99	178	507
408	1	1810	1049	[gb S76213]	[sep23-alkaline shock protein 23 (methicillin resistant) [Staphylococcus aureus, 912. Genomic, 1360 nt]	99	163	762
418	1	2	217	[gb A1499]	[Staphylococcus aureus ORF1, partial cds, ORF2, ORF3, autolysin (atl) genes, complete cds	100	216	216
418	2	854	639	[dbj D17366 STAA	[Staphylococcus aureus atl gene for autolysin, complete cds and other ORFs	100	188	216
421	2	1262	2509	[gb L43098]	[transposon Tn5401 and insertion sequences IS1181 and IS1182 (from Staphylococcus aureus) DNA	99	1248	1248
422	1	2	325	[gb K02985]	[S. aureus (strain RN450) transposon Tn534 insertion site	96	200	374
427	1	865	434	[dbj J028879 STAP	[Staphylococcus aureus gene for penicillin-binding protein 1, complete cds	100	432	432
427	2	1829	1122	[dbj J028879 STAP	[Staphylococcus aureus gene for penicillin-binding protein 1, complete cds	100	151	708
435	1	2	808	[dbj D86240 D862	[Staphylococcus aureus gene for unknown function and dlt operon dltA, dltB, dltC and dltD genes, complete cds	100	556	807
435	2	432	999	[dbj D86240 D862	[Staphylococcus aureus gene for unknown function and dlt operon dltA, dltB, dltC and dltD genes, complete cds	100	134	168
436	1	1341	685	[emb X17688 SAFE	[S. aureus factor essential for expression of methicillin resistance (fema) gene, complete cds, and trpA gene, 3' end	97	657	657

TABLE 1

TABLE 1

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	percent Ident	HSP nt length	ORF nt length
436	2	2403	1657	[emb]X176R8[SARF]	S.aureus factor essential for expression of methicillin resistance (femA) gene, complete cds, and trpA gene, 3' and	100	294	747
442	1	347	1300	[emb]X72700[SAPV]	S.aureus genes for S and F components of Pantone-Valentine leucocidins	84	204	954
445	2	1906	2178	[gb]L01055]	Staphylococcus aureus gamma-hemolysin components A, B and C (hlgA, hlgB, hlgC) genes, complete cds	98	187	273
447	1	167	1078	[gb]U19770]	Staphylococcus aureus pyrrolidone carboxyl peptidase (pcp) gene, complete cds	100	51	912
447	2	1176	1784	[gb]U19770]	Staphylococcus aureus pyrrolidone carboxyl peptidase (pcp) gene, complete cds	96	597	609
454	3	7309	4319	[emb]Z18852[SACF]	S.aureus gene for clumping factor	75	653	2991
472	4	7896	5479	[gb]L25288]	Staphylococcus aureus pyrase-like protein alpha and beta subunit (gria and griB) genes, complete cds	99	2418	2418
472	5	8120	6792	[gb]L25288]	Staphylococcus aureus pyrase-like protein alpha and beta subunit (gria and griB) genes, complete cds	99	1328	1329
475	2	566	889	[emb]X32543[SAGQ]	S.aureus agrA, agrB and hld genes	100	76	324
481	4	1922	1560	[emb]X64172[SARP]	S.aureus rplL, rplM, rplN, rplO, rplP, rplQ, rplR, rplS, rplT, rplU, rplV, rplW, rplX, rplY, rplZ, rpl1, rpl2, rpl3, rpl4, rpl5, rpl6, rpl7, rpl8, rpl9, rpl10, rpl11, rpl12, rpl13, rpl14, rpl15, rpl16, rpl17, rpl18, rpl19, rpl20, rpl21, rpl22, rpl23, rpl24, rpl25, rpl26, rpl27, rpl28, rpl29, rpl30, rpl31, rpl32, rpl33, rpl34, rpl35, rpl36, rpl37, rpl38, rpl39, rpl40, rpl41, rpl42, rpl43, rpl44, rpl45, rpl46, rpl47, rpl48, rpl49, rpl50, rpl51, rpl52, rpl53, rpl54, rpl55, rpl56, rpl57, rpl58, rpl59, rpl60, rpl61, rpl62, rpl63, rpl64, rpl65, rpl66, rpl67, rpl68, rpl69, rpl70, rpl71, rpl72, rpl73, rpl74, rpl75, rpl76, rpl77, rpl78, rpl79, rpl80, rpl81, rpl82, rpl83, rpl84, rpl85, rpl86, rpl87, rpl88, rpl89, rpl90, rpl91, rpl92, rpl93, rpl94, rpl95, rpl96, rpl97, rpl98, rpl99, rpl100, rpl101, rpl102, rpl103, rpl104, rpl105, rpl106, rpl107, rpl108, rpl109, rpl110, rpl111, rpl112, rpl113, rpl114, rpl115, rpl116, rpl117, rpl118, rpl119, rpl120, rpl121, rpl122, 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rpl998, rpl999, rpl1000	100	250	363
481	5	1244	1534	[emb]X64172[SARP]	S.aureus rplL, rplM, rplN, rplO, rplP, rplQ, rplR, rplS, rplT, rplU, rplV, rplW, rplX, rplY, rplZ, rpl1, rpl2, rpl3, rpl4, rpl5, rpl6, rpl7, rpl8, rpl9, rpl10, rpl11, rpl12, rpl13, rpl14, rpl15, rpl16, rpl17, rpl18, rpl19, rpl20, rpl21, rpl22, rpl23, rpl24, rpl25, rpl26, rpl27, rpl28, rpl29, rpl30, rpl31, rpl32, rpl33, rpl34, rpl35, rpl36, rpl37, rpl38, rpl39, rpl40, rpl41, rpl42, rpl43, rpl44, rpl45, rpl46, rpl47, rpl48, rpl49, rpl50, rpl51, rpl52, rpl53, rpl54, rpl55, rpl56, rpl57, rpl58, rpl59, rpl60, rpl61, rpl62, rpl63, rpl64, rpl65, rpl66, rpl67, rpl68, rpl69, rpl70, rpl71, rpl72, rpl73, rpl74, rpl75, rpl76, rpl77, rpl78, rpl79, rpl80, rpl81, rpl82, rpl83, rpl84, rpl85, rpl86, rpl87, rpl88, rpl89, rpl90, rpl91, rpl92, rpl93, rpl94, rpl95, rpl96, rpl97, rpl98, rpl99, rpl100, rpl101, rpl102, rpl103, rpl104, rpl105, rpl106, rpl107, rpl108, rpl109, rpl110, rpl111, rpl112, rpl113, rpl114, rpl115, rpl116, rpl117, rpl118, rpl119, rpl120, rpl121, rpl122, 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rpl623, rpl624, rpl625, rpl626, rpl627, rpl628, rpl629, rpl630, rpl631, rpl632, rpl633, rpl634, rpl635, rpl636, rpl637, rpl638, rpl639, rpl640, rpl641, rpl642, rpl643, rpl644, rpl645, rpl646, rpl647, rpl648, rpl649, rpl650, rpl651, rpl652, rpl653, rpl654, rpl655, rpl656, rpl657, rpl658, rpl659, rpl660, rpl661, rpl662, rpl663, rpl664, rpl665, rpl666, rpl667, rpl668, rpl669, rpl670, rpl671, rpl672, rpl673, rpl674, rpl675, rpl676, rpl677, rpl678, rpl679, rpl680, rpl681, rpl682, rpl683, rpl684, rpl685, rpl686, rpl687, rpl688, rpl689, rpl690, rpl691, rpl692, rpl693, rpl694, rpl695, rpl696, rpl697, rpl698, rpl699, rpl700, rpl701, rpl702, rpl703, rpl704, rpl705, rpl706, rpl707, rpl708, rpl709, rpl710, rpl711, rpl712, rpl713, rpl714, rpl715, rpl716, rpl717, rpl718, rpl719, rpl720, rpl721, rpl722, rpl723, rpl724, rpl725, rpl726, rpl727, rpl728, rpl729, rpl730, rpl731, rpl732, rpl733, rpl734, rpl735, rpl736, rpl737, rpl738, rpl739, rpl740, rpl741, rpl742, rpl743, rpl744, rpl745, rpl746, rpl747, rpl748, rpl749, rpl750, rpl751, rpl752, rpl753, rpl754, rpl755, rpl756, rpl757, rpl758, rpl759, rpl760, rpl761, rpl762, rpl763, rpl764, rpl765, rpl766, rpl767, rpl768, rpl769, rpl770, rpl771, rpl772, rpl773, rpl774, rpl775, rpl776, rpl777, rpl778, rpl779, rpl780, rpl781, rpl782, rpl783, rpl784, rpl785, rpl786, rpl787, rpl788, rpl789, rpl790, rpl791, rpl792, rpl793, rpl794, rpl795, rpl796, rpl797, rpl798, rpl799, rpl800, rpl801, rpl802, rpl803, rpl804, rpl805, rpl806, rpl807, rpl808, rpl809, rpl810, rpl811, rpl812, rpl813, rpl814, rpl815, rpl816, rpl817, rpl818, rpl819, rpl820, rpl821, rpl822, rpl823, rpl824, rpl825, rpl826, rpl827, rpl828, rpl829, rpl830, rpl831, rpl832, rpl833, rpl834, rpl835, rpl836, rpl837, rpl838, rpl839, rpl840, rpl841, rpl842, rpl843, rpl844, rpl845, rpl846, rpl847, rpl848, rpl849, rpl850, rpl851, rpl852, rpl853, rpl854, rpl855, rpl856, rpl857, rpl858, rpl859, rpl860, rpl861, rpl862, rpl863, rpl864, rpl865, rpl866, rpl867, rpl868, rpl869, rpl870, rpl871, rpl872, rpl873, rpl874, rpl875, rpl876, rpl877, rpl878, rpl879, rpl880, rpl881, rpl882, rpl883, rpl884, rpl885, rpl886, rpl887, rpl888, rpl889, rpl890, rpl891,			

S. aureus - Coding regions containing known sequences

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	percent ident	HSP nt length	ORF nt length
528	2	58	963	gb U19300	Staphylococcus aureus DNA sequence encoding three ORFs. Complete cds: prophage phi-11 sequence homology, 5' flank	99	260	906
528	3	1098	2870	gb U19300	Staphylococcus aureus DNA sequence encoding three ORFs. Complete cds: prophage phi-11 sequence homology, 5' flank	99	866	1773
530	1	3	434	gb U11979	Staphylococcus aureus chorismate synthase (aroC) and nucleoside diphosphate kinase (ndk) genes, complete cds, dehydroquinase synthase (aroB) and geranylgeranyl pyrophosphate synthetase homolog (gerCC) genes, partial cds	99	432	432
530	2	1211	2395	gb U11979	Staphylococcus aureus chorismate synthase (aroC) and nucleoside diphosphate kinase (ndk) genes, complete cds, dehydroquinase synthase (aroB) and geranylgeranyl pyrophosphate synthetase homolog (gerCC) genes, partial cds	91	1185	1185
530	3	2409	2801	gb U11979	Staphylococcus aureus chorismate synthase (aroC) and nucleoside diphosphate kinase (ndk) genes, complete cds, dehydroquinase synthase (aroB) and geranylgeranyl pyrophosphate synthetase homolog (gerCC) genes, partial cds	88	181	393
530	4	2690	3484	gb U05004	Staphylococcus aureus dehydroquinase synthase (aroB) gene, 3' end cds: 3-phosphoshikimate-1-carboxyvinyltransferase (aroA) gene, complete cds: ORF3, complete cds	100	75	795
530	5	3442	4792	gb U05004	Staphylococcus aureus dehydroquinase synthase (aroB) gene, 3' end cds: 3-phosphoshikimate-1-carboxyvinyltransferase (aroA) gene, complete cds: ORF3, complete cds	99	905	1311
530	6	4790	5380	gb U05004	Staphylococcus aureus dehydroquinase synthase (aroB) gene, 3' end cds: 3-phosphoshikimate-1-carboxyvinyltransferase (aroA) gene, complete cds: ORF3, complete cds	100	196	591
539	1	3	338	emb X76490 SAGL	S. aureus (b0270) glnA and glnR genes	99	336	336
539	2	336	527	emb X76490 SAGL	S. aureus (b0270) glnA and glnR genes	100	189	192
554	1	727	365	gb U73374	Staphylococcus aureus type 8 capsule genes, cap8A, cap8B, cap8C, cap8D, cap8E, cap8F, cap8G, cap8H, cap8I, cap8J, cap8K, cap8L, cap8M, cap8N, cap8O, cap8P, complete cds	100	54	363
554	2	2175	1252	gb U73374	Staphylococcus aureus type 8 capsule genes, cap8A, cap8B, cap8C, cap8D, cap8E, cap8F, cap8G, cap8H, cap8I, cap8J, cap8K, cap8L, cap8M, cap8N, cap8O, cap8P, complete cds	99	918	924
554	3	1574	1374	gb U73374	Staphylococcus aureus type 8 capsule genes, cap8A, cap8B, cap8C, cap8D, cap8E, cap8F, cap8G, cap8H, cap8I, cap8J, cap8K, cap8L, cap8M, cap8N, cap8O, cap8P, complete cds	96	122	201
584	2	1019	705	gb U21221	Staphylococcus aureus hyaluronate lyase (hysA) gene, complete cds	99	306	315
587	3	1475	4288	emb Z18852 SACF	S. aureus gene for clumping factor	98	2588	2814
59A	1	38A1	1953	dbj D28879 STAP	Staphylococcus aureus gene for penicillin-binding protein 1, complete cds	99	1873	1929

TABLE 1

S. aureus - Coding regions containing known sequences

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	percent ident	HSP nt length	ORF nt length
605	1	2	745	[ubj]086240 0862	Staphylococcus aureus gene for unknown function and dlt operon dltA, dltB, dltC and dltD genes, complete cds	98	338	744
609	1	1628	816	[emb]X76490 SAGL	S. aureus (bb270) glnA and glnK genes	100	495	813
614	1	1280	642	[gb]M32103	Staphylococcus aureus lac repressor (lacR) gene, complete cds and lacA repressor (lacA), partial cds	99	639	639
626	1	2508	1255	[gb]M63176	Staphylococcus aureus helicase required for T181 replication (pcrA) gene, complete cds	100	225	1251
626	2	3315	2284	[gb]M63176	Staphylococcus aureus helicase required for T181 replication (pcrA) gene, complete cds	99	838	1032
629	1	1999	1001	[emb]X17688 SAFE	S. aureus factor essential for expression of methicillin resistance (femA) gene, complete cds, and trpA gene, 3' end	99	990	999
629	2	1407	1195	[emb]X17688 SAFE	S. aureus factor essential for expression of methicillin resistance (femA) gene, complete cds, and trpA gene, 3' end	98	194	213
631	2	5126	3228	[emb]Z18852 SACF	S. aureus gene for clumping factor	82	489	1899
632	1	3	551	[emb]Z10588 SAST	S. aureus (RM4220) genes for potential ABC transporter and potential membrane spanning protein	99	549	549
632	2	529	1323	[emb]Z10588 SAST	S. aureus (RM4220) genes for potential ABC transporter and potential membrane spanning protein	99	795	795
651	1	1909	1070	[gb]L19300	Staphylococcus aureus DNA sequence encoding three ORFs, complete cds; prophage phi-11 sequence homology, 5' flank	99	478	840
657	2	1800	1105	[gb]L14017	Staphylococcus aureus methicillin-resistance protein (mecR) gene and unknown ORF, complete cds	84	456	696
662	1	908	456	[emb]X13404 SAHL	Staphylococcus aureus hlb gene for beta-hemolysin	100	369	453
662	2	230	475	[emb]X13404 SAHL	Staphylococcus aureus hlb gene for beta-hemolysin	100	246	246
662	3	746	1399	[emb]X13404 SAHL	Staphylococcus aureus hlb gene for beta-hemolysin	99	653	654
682	1	956	480	[gb]H63177	S. aureus sigma factor (plac) gene, complete cds	100	136	477
685	1	1182	592	[gb]U65000	Staphylococcus aureus type-1 signal peptidase SpaA (spaA) gene, and type-1 signal peptidase SpSB (spSB) gene, complete cds	98	534	591
685	2	1716	1153	[gb]U65000	Staphylococcus aureus type-1 signal peptidase SpaA (spaA) gene, and type-1 signal peptidase SpSB (spSB) gene, complete cds	96	564	564
697	1	3	527	[gb]H63177	S. aureus sigma factor (plac) gene, complete cds	100	195	525
697	2	485	784	[gb]H63177	S. aureus sigma factor (plac) gene, complete cds	97	280	300

TABLE 1

S. aureus - Coding regions containing known sequences

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	Percent ident	HSP nt length	ORF nt length
710	1	15	503	[dbj DR6240 DR62]	[Staphylococcus aureus gene for unknown function and dlt operon dltA, dltB, dltC and dltD genes, complete cds]	99	217	489
733	1	26	205	[gb MR0252]	[Staphylococcus aureus norA199 gene (which mediates active efflux of fluoroquinolones), complete cds]	97	140	180
741	1	1736	1197	[dbj UR1951 STAL]	[Staphylococcus aureus DNA for LukM component, LukF-PV like component, complete cds]	81	522	540
752	1	1	636	[emb Y00356 SASP]	[Staphylococcus aureus V8 serine protease gene]	99	618	636
752	2	588	956	[emb Y00356 SASP]	[Staphylococcus aureus V8 serine protease gene]	99	340	349
756	1	1308	709	[emb X01645 SATO]	[Staphylococcus aureus (Wood 46) gene for alpha-toxin]	98	567	600
777	1	1582	950	[emb Z49245 SA42]	[S. aureus partial sod gene for superoxide dismutase]	99	429	633
780	1	1111	557	[gb U20503]	[Staphylococcus aureus HMC class-II analog gene, complete cds]	86	550	555
784	1	73	687	[gb U63529]	[Staphylococcus aureus novel antigen gene, complete cds]	99	568	615
797	1	182	544	[dbj D14711 STAH]	[Staphylococcus aureus HSP10 and HSP60 genes]	98	363	363
798	1	532	302	[emb X58434 SAPD]	[S. aureus pHA, pHC and pHD genes for pyruvate decarboxylase, dihydrolipoamide acetyltransferase and dihydrolipoamide dehydrogenase]	95	196	231
823	1	3	467	[gb S77055]	[ecf cluster: dnaA-replisome assembly protein...gyrB-DNA gyrase beta subunit [Staphylococcus aureus, Y8886, Genomic, 5 genes, 3573 nt]]	99	156	465
848	1	348	175	[gb U25288]	[Staphylococcus aureus gyrase-like protein alpha and beta subunit (gria and griB) genes, complete cds]	99	174	174
848	2	476	318	[gb U25288]	[Staphylococcus aureus gyrase-like protein alpha and beta subunit (gria and griB) genes, complete cds]	100	131	159
866	1	792	397	[emb X64172 SARP]	[S. aureus rplL, rplM, rplN, rplO genes for ribosomal protein L17/L12, hypothetical protein ORF202, DNA-directed RNA polymerase beta L beta' chains]	99	395	396
883	1	1	285	[dbj D90119 STAH]	[S. aureus norA gene]	99	131	285
884	1	606	334	[emb X52543 SAAG]	[S. aureus agrA, agrB and hld genes]	98	265	273
884	2	716	522	[emb X52543 SAAG]	[S. aureus agrA, agrB and hld genes]	100	195	195
912	2	517	681	[emb Z30588 SAST]	[S. aureus (RN4220) genes for potential ABC transporter and potential membrane spanning protein]	99	163	165
917	1	2	265	[gb M64724]	[S. aureus tagatose 6-phosphate isomerase gene, complete cds]	99	247	264
917	2	238	396	[gb M64724]	[S. aureus tagatose 6-phosphate isomerase gene, complete cds]	95	147	159
918	1	2426	1215	[emb X93305 SAPT]	[S. aureus pish and pisi genes]	99	1212	1212

TABLE I

S. aureus - Coding regions containing known sequences

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	Percent ident	ORF nt length
967	1	1	411	[dbj 190119 STAM	S. aureus nraA gene	97	395
991	1	672	337	[emb X52543 SAAG	S. aureus agrA, agrB and hid genes	99	336
1000	1	1117	845	[gb L14017	Staphylococcus aureus methicillin-resistance protein (mecR) gene and unknown ORF, complete cds	78	190
1001	1	498	265	[dbj D86240 D862	Staphylococcus aureus gene for unknown function and dlt operon dltA, dltB, dltC and dltD genes, complete cds	99	234
1010	1	1	285	[gb U21221	Staphylococcus aureus hyaluronate lyase (hysA) gene, complete cds	99	224
1046	1	656	310	[emb X72700 SAPV	S. aureus genes for S and F components of Panton-Valentine leukocidins	85	205
1080	1	480	286	[emb X58434 SAPD	S. aureus pdhA, pdhC and pdhD genes for pyruvate decarboxylase, dihydroliposamide acetyltransferase and dihydroliposamide dehydrogenase	99	180
1073	1	1176	589	[gb K02985	S. aureus (strain RN450) transposon Tn554 insertion site	100	131
1079	1	3	230	[dbj D86240 D862	Staphylococcus aureus gene for unknown function and dlt operon dltA, dltB, dltC and dltD genes, complete cds	99	228
1079	2	218	484	[dbj D86240 D862	Staphylococcus aureus gene for unknown function and dlt operon dltA, dltB, dltC and dltD genes, complete cds	100	267
1079	1	460	645	[dbj D86240 D862	Staphylococcus aureus gene for unknown function and dlt operon dltA, dltB, dltC and dltD genes, complete cds	100	186
1092	1	289	146	[emb X58434 SAPD	S. aureus pdhA, pdhC and pdhD genes for pyruvate decarboxylase, dihydroliposamide acetyltransferase and dihydroliposamide dehydrogenase	98	124
1143	1	1	243	[gb H63177	S. aureus sigma factor (plac) gene, complete cds	99	243
1157	1	2	136	[emb Z48003 SXOW	S. aureus gene for DNA polymerase III	97	127
1189	1	720	361	[gb S74031	[nraA-nraA] [SP794] [Staphylococcus aureus, NCTC 8325, Insertion, 1820 nt]	99	360
1190	1	2	283	[gb H21854	S. aureus agr gene encoding an accessory gene regulator protein, complete cds	100	282
1190	2	1127	888	[emb X52543 SAAG	S. aureus agrA, agrB and hid genes	100	240
1225	1	2	163	[emb X17679 SACO	Staphylococcus aureus coa gene for coagulase	97	124
1243	1	2	529	[dbj D86240 D862	Staphylococcus aureus gene for unknown function and dlt operon dltA, dltB, dltC and dltD genes, complete cds	99	495
1244	1	1	210	[gb S74031	[nraA-nraA] [SP794] [Staphylococcus aureus, NCTC 8325, Insertion, 1820 nt]	100	210
1301	1	41	472	[emb X76490 CNDL	S. aureus (bb270) glbA and glbB genes	99	299

TABLE I

S. aureus - coding regions containing known sequences

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	percent ident	HSP nt length	ORF nt length
1315	1	18	326	emb X64172 SARP	S. aureus rplL, orf202, rpsB(rif) and rpoC genes for ribosomal protein L7/L12, hypothetical protein ORF202, DNA-directed RNA polymerase beta L beta' chains	98	277	309
1519	1	2	175	dbj D28879 STAP	Staphylococcus aureus gene for penicillin-binding protein 1, complete cds	98	139	176
1663	1	1346	675	dbj D64240 D662	Staphylococcus aureus gene for unknown function and dit operon dltA, dltB, dltC and dltD genes, complete cds	98	672	672
1797	1	644	324	gb U73374	Staphylococcus aureus type 8 capsule genes, cap8A, cap8B, cap8C, cap8D, cap8E, cap8F, cap8G, cap8H, cap8I, cap8J, cap8K, cap8L, cap8M, cap8N, cap8O, cap8P, complete cds	99	321	321
1857	1	1	192	gb U90536	Staphylococcus aureus alpha-hemolysin gene, 3' end	98	192	192
1923	1	2	181	emb X17688 SAFE	S. aureus factor essential for expression of methicillin resistance (femA) gene, complete cds, and trpA gene, 3' end	100	180	180
1957	1	2	346	gb U60589	Staphylococcus aureus novel antigen gene, complete cds	99	345	345
1988	1	1	402	dbj D66240 D662	Staphylococcus aureus gene for unknown function and dit operon dltA, dltB, dltC and dltD genes, complete cds	100	402	402
2100	1	414	208	gb H63177	S. aureus sigma factor (plaC) gene, complete cds	99	207	207
2199	1	1	402	gb U66664	Staphylococcus aureus DNA fragment with class II promoter activity	99	131	402
2537	1	308	156	emb X17688 SAFE	S. aureus factor essential for expression of methicillin resistance (femA) gene, complete cds, and trpA gene, 3' end	99	153	153
2891	1	2	400	gb U35436	Staphylococcus aureus penicillin-binding protein 2 (pbp2) gene, complete cds	99	399	399
2950	1	778	398	dbj D30690 STAN	Staphylococcus aureus genes for ORF37; HSP20; HSP70; HSP40; ORF35, complete cds	100	358	381
2971	1	3	398	gb U51132	Staphylococcus aureus o-succinylbenzoic acid CoA ligase (heme), and o-succinylbenzoic acid synthetase (heme) genes, complete cds	97	272	396
2978	1	618	328	gb U31979	Staphylococcus aureus chorismate synthase (aroC) and nucleoside diphosphate kinase (ndk) genes, complete cds, dehydrogenase synthase (aroB) and geranylgeranyl pyrophosphate synthetase homolog (gerCC) genes, partial cds	98	250	291
2985	1	832	464	emb X17679 SACO	Staphylococcus aureus coa gene for coagulase	98	347	369
3006	1	2170	1784	gb U11779	Staphylococcus aureus methicillin-resistant ATCC 33952 clone RNW30 165-235 rRNA spacer region	87	82	387
3008	1	474	238	dbj D30690 STAN	Staphylococcus aureus genes for ORF37; HSP20; HSP70; HSP40; ORF35, complete cds	88	178	237
3008	2	451	281	dbj U30690 STAN	Staphylococcus aureus genes for ORF37; HSP20; HSP70; HSP40; ORF35, complete cds	97	120	171

TABLE 1

S aureus - Coding regions containing known sequences

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	percent ident	HSP length	ORF nt length
3011	1	793	398	[emb]X62992 SAFN	S. aureus fnbB gene for fibronectin binding protein B	93	72	396
3019	1	2	235	[gb]J03479	S. aureus enzyme III-lac (lacF), enzyme II-lac (lacE), and phospho-beta-galactosidase (lacG) genes, complete cds	97	234	234
3023	3	81	233	[gb]U06451	Staphylococcus aureus proline permease homolog (putP) gene, complete cds	87	100	153
3029	1	90	267	[gb]U51133	Staphylococcus aureus phosphoenolpyruvate carboxykinase (pckA) gene, complete cds	100	135	198
3039	1	18	164	[gb]U51133	Staphylococcus aureus phosphoenolpyruvate carboxykinase (pckA) gene, complete cds	97	135	147
3039	2	70	327	[gb]U51133	Staphylococcus aureus phosphoenolpyruvate carboxykinase (pckA) gene, complete cds	77	183	258
3056	1	3	215	[emb]X64172 SARP	S. aureus rplL, orf202, rpoB(rif) and rpoC genes for ribosomal protein L7/L12, hypothetical protein ORF202, DNA-directed RNA polymerase beta & beta' chains	99	213	213
3059	1	1	261	[dbj]D30690 STAN	Staphylococcus aureus genes for ORF37, ORF70, ORF73, ORF75, complete cds	98	234	261
3073	1	27	284	[gb]U06451	Staphylococcus aureus proline permease homolog (putP) gene, complete cds	99	229	258
3074	1	2	397	[emb]X64172 SARP	S. aureus rplL, orf202, rpoB(rif) and rpoC genes for ribosomal protein L7/L12, hypothetical protein ORF202, DNA-directed RNA polymerase beta & beta' chains	96	350	396
3088	1	3	219	[dbj]D86727 D867	Staphylococcus aureus DNA for DNA polymerase III, complete cds	95	215	237
3077	1	444	244	[emb]Z48003 SARP	S. aureus gene for DNA polymerase III	97	160	201
3102	1	307	155	[gb]J03479	S. aureus enzyme III-lac (lacF), enzyme II-lac (lacE), and phospho-beta-galactosidase (lacG) genes, complete cds	97	162	153
3121	1	568	398	[emb]X58434 SAPD	S. aureus pdhB, pdhC and pdhD genes for pyruvate decarboxylase, dihydroliposamide acetyltransferase and dihydroliposamide dehydrogenase	100	88	171
3125	1	463	233	[emb]X89211 SARP	S. aureus DNA for rpoC gene	98	192	231
3133	1	2	175	[emb]Z18852 SACF	S. aureus gene for clumping factor	96	154	174
3160	1	420	211	[dbj]J010489 STAG	Staphylococcus aureus genes for DNA gyrase A and B, complete cds	89	197	210
3176	1	1	378	[emb]X58434 SAPD	S. aureus pdhB, pdhC and pdhD genes for pyruvate decarboxylase, dihydroliposamide acetyltransferase and dihydroliposamide dehydrogenase	96	91	378
3192	1	420	211	[gb]J03479	S. aureus enzyme III-lac (lacF), enzyme II-lac (lacE), and phospho-beta-galactosidase (lacG) genes, complete cds	98	72	210
3210	1	3	143	[gb]U07614	Staphylococcus aureus neoptidoglycan hydrolase gene, complete cds	96	141	141

TABLE I

S. aureus - Coding regions containing known sequences

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	percent ident	RSP nt length	ORF nt length
3232	3	2106	1282	[gb L14017]	Staphylococcus aureus methicillin-resistance protein (mecA) gene and unknown ORF, complete cds	71	257	825
333A	1	2	194	[emb X84231 SARP	S. aureus DNA for rpoC gene	99	316	393
3543	1	392	634	[gb L11530]	Staphylococcus aureus transfer RNA sequence with two rRNAs	99	102	243
3555	1	637	320	[emb 218852 SACF	S. aureus gene for clumping factor	99	307	318
3559	1	3	182	[emb X17679 SACO	Staphylococcus aureus coa gene for coagulase	100	141	180
3559	2	95	313	[emb X17679 SACO	Staphylococcus aureus coa gene for coagulase	98	174	219
3563	1	278	141	[gb UJ5773]	Staphylococcus aureus prol.; protein diacylglycerol transferase (lgt) gene, complete cds	100	79	138
3563	2	527	363	[gb UJ5773]	Staphylococcus aureus prolipoprotein diacylglycerol transferase (lgt) gene, complete cds	98	162	165
3566	1	3	422	[emb X16457 SAST	Staphylococcus aureus gene for staphylocoagulase	98	175	420
3588	1	2	262	[gb L43098]	Transposon Tn3404 and insertion sequences IS1181 and IS1182 (from Staphylococcus aureus) DNA	99	253	261
3593	1	1	350	[gb J03479]	S. aureus enzyme III-lac (lacf), enzyme II-lac (lacf), and phospho-beta-galactosidase (lacG) genes, complete cds	99	345	348
3600	1	758	381	[emb 218852 SACF	S. aureus gene for clumping factor	72	346	378
3602	1	788	396	[emb 218852 SACF	S. aureus gene for clumping factor	98	319	393
3656	1	1013	528	[emb 218852 SACF	S. aureus gene for clumping factor	84	403	486
3682	1	3	236	[emb X64172 SARP	S. aureus rplL, orf202, rpoB(rif) and rpoC genes for ribosomal protein L7/L12, hypothetical protein ORF201, DNA-directed RNA polymerase beta & beta' chains	100	231	234
3682	2	224	415	[emb X64172 SARP	S. aureus rplL, orf202, rpoB(rif) and rpoC genes for ribosomal protein L7/L12, hypothetical protein ORF202, DNA-directed RNA polymerase beta & beta' chains	100	112	192
3693	1	758	423	[emb X62992 SAFN	S. aureus fnbB gene for fibronectin binding protein B	100	229	336
3702	1	593	354	[gb L11530]	Staphylococcus aureus transfer RNA sequence with two rRNAs	94	81	240
3725	1	924	463	[emb 218852 SACF	S. aureus gene for clumping factor	71	367	462
3761	1	809	450	[gb L14017]	Staphylococcus aureus methicillin-resistance protein (mecA) gene and unknown ORF, complete cds	95	333	380
3767	1	1	402	[emb X64172 SARP	S. aureus rplL, orf202, rpoB(rif) and rpoC genes for ribosomal protein L7/L12, hypothetical protein ORF202, DNA-directed RNA polymerase beta & beta' chains	98	387	402

TABLE 1

S. aureus - Coding regions containing known sequences

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	percent ident	ISF nt length	ORF nt length
3775	1	2	286	[emb]X64172[SARP]	S. aureus rplL, orf202, rpoB(rif) and rpoC genes for ribosomal protein L7/L12, hypothetical protein ORF202, DNA-directed RNA polymerase beta & beta' chains	100	227	285
3786	1	456	229	[dbj]D10489[STAG]	Staphylococcus aureus genes for DNA gyrase A and B, complete cds	100	204	228
3786	2	542	366	[dbj]D10489[STAG]	Staphylococcus aureus genes for DNA gyrase A and B, complete cds	95	123	177
3798	1	3	251	[emb]X17679[SACO]	Staphylococcus aureus coe gene for coagulase	99	249	249
3813	1	793	398	[gb]J04151]	S. aureus fibronectin-binding protein (fnbA) mRNA, complete cds	98	336	396
3819	1	184	402	[emb]X68425[SA23]	S. aureus gene for 23S rRNA	99	161	219
3844	1	932	468	[gb]U48826]	Staphylococcus aureus elastin binding protein (ebpS) gene, complete cds	87	204	465
3845	1	1	381	[emb]X58434[SAPD]	S. aureus pdhB, pdhC and pdhD genes for pyruvate decarboxylase, dihydrolipoamide acetyltransferase and dihydrolipoamide dehydrogenase	94	356	441
3856	1	798	400	[gb]J14017]	Staphylococcus aureus methicillin-resistance protein (mecR) gene and unknown ORF, complete cds	76	192	399
3859	1	1049	573	[emb]Z18852[SACF]	S. aureus gene for clumping factor	85	347	477
3871	1	650	327	[gb]M76716]	Staphylococcus aureus peptidoglycan hydrolase gene, complete cds	100	299	324
3876	1	2	253	[dbj]D10489[STAG]	Staphylococcus aureus genes for DNA gyrase A and B, complete cds	100	217	252
3877	1	572	288	[gb]J03479]	S. aureus enzyme III-lac (lacF), enzyme II-lac (lacE), and phospho-beta-galactosidase (lacG) genes, complete cds	97	209	285
3878	1	1	237	[emb]X58434[SAPD]	S. aureus pdhB, pdhC and pdhD genes for pyruvate decarboxylase, dihydrolipoamide acetyltransferase and dihydrolipoamide dehydrogenase	96	155	237
3888	1	3	173	[emb]X16457[SAST]	Staphylococcus aureus gene for staphylocoagulase	98	171	171
3893	1	3	183	[emb]X89233[SARP]	S. aureus DNA for rpoC gene	100	170	183
3893	2	181	357	[emb]X89233[SARP]	S. aureus DNA for rpoC gene	98	79	177
3894	1	3	485	[emb]X64172[SARP]	S. aureus rplL, orf202, rpoB(rif) and rpoC genes for ribosomal protein L7/L12, hypothetical protein ORF202, DNA-directed RNA polymerase beta & beta' chains	99	450	483
3895	1	436	420	[gb]J04151]	S. aureus fibronectin-binding protein (fnbA) mRNA, complete cds	99	411	417
3905	1	48	239	[gb]U05004]	Staphylococcus aureus dehydroquinase synthase (aroB) gene, 3' and cds; 3-phosphoshikimate-1-carboxyvinyltransferase (aroA) gene, complete cds; ORF3, complete cds	100	159	192
3905	2	188	400	[gb]U05004]	Staphylococcus aureus dehydroquinase synthase (aroB) gene, 3' and cds; 3-phosphoshikimate-1-carboxyvinyltransferase (aroA) gene, complete cds; ORF3, complete cds	97	88	213

TABLE I

S. aureus - Coding regions containing known sequences

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	percent ident	HSP nt length	ORF nt length
3910	1	3	359	emb X58434 SAPD	S. aureus pdhA, pdhC and pdhD genes for pyruvate decarboxylase, dihydroliposamide acetyltransferase and dihydroliposamide dehydrogenase	99	278	357
3915	1	1	330	gb U14017	Staphylococcus aureus methicillin-resistance protein (mecR) gene and unknown ORF, complete cds	75	175	330
3964	1	691	347	emb Z48003 SADN	S. aureus gene for DNA polymerase III	100	295	345
4007	1	109	390	emb X16457 SAST	Staphylococcus aureus gene for staphylocoagulase	98	163	192
4036	1	3	371	dbj D10489 STAG	Staphylococcus aureus genes for DNA gyrase A and B, complete cds	99	339	369
4046	1	692	348	emb Z18852 SACF	S. aureus gene for clumping factor	87	221	345
4060	1	1	375	emb Z18852 SACF	S. aureus gene for clumping factor	96	271	375
4061	1	860	432	emb Z48003 SADN	S. aureus gene for DNA polymerase III	99	429	429
4062	1	606	304	gb U14017	Staphylococcus aureus methicillin-resistance protein (mecR) gene and unknown ORF, complete cds	75	198	303
4085	1	58	402	gb U11786	Staphylococcus aureus methicillin-resistant ATCC 33952 clone RN4216S-23S rRNA spacer region	98	127	345
4088	1	2	301	gb U14098	Transposon Tn5404 and insertion sequences IS1181 and IS1182 (from Staphylococcus aureus) U1A	99	227	300
4093	1	2	277	emb X58434 SAPD	S. aureus pdhD, pdhC and pdhB genes for pyruvate decarboxylase, dihydroliposamide acetyltransferase and dihydroliposamide dehydrogenase	99	276	276
4097	1	1	402	emb Z18852 SACF	S. aureus gene for clumping factor	74	307	402
4116	1	22	402	gi U05004	Staphylococcus aureus dehydroquinase synthase (aroH) gene, 3' end cds; 3-phosphoshikimate-1-carboxyvinyltransferase (aroA) gene, complete cds; ORF, complete cds	98	157	381
4125	1	240	401	gb U73374	Staphylococcus aureus type 8 capsule genes, cap8A, cap8B, cap8C, cap8D, cap8E, cap8F, cap8G, cap8H, cap8I, cap8J, cap8K, cap8L, cap8M, cap8N, cap8O, cap8P, complete cds	100	86	162
4149	1	35	247	gb U04151	S. aureus fibronectin-binding protein (fbaA) mRNA, complete cds	99	200	213
4151	1	629	366	gb U14017	Staphylococcus aureus methicillin-resistance protein (mecR) gene and unknown ORF, complete cds	87	150	264
4154	1	754	398	emb X64172 SARP	S. aureus rplL, orf202, rpoB(rif) and rpoC genes for ribosomal protein L7/L12, hypothetical protein ORF202, DNA-directed RNA polymerase beta & beta' chains	99	297	357
4179	1	1	294	emb X64172 SARP	S. aureus rplL, orf202, rpoB(rif) and rpoC genes for ribosomal protein L7/L12, hypothetical protein ORF202, DNA-directed RNA polymerase beta & beta' chains	98	240	294

TABLE I

S. aureus - Coding regions containing known sequences

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	percent ident	ORF length	ORF nt length
4203	1	1	255	emb X89233 SARP	S. aureus DNA for rpoC gene	99	239	255
4206	1	1	303	emb 218852 SACF	S. aureus gene for clumping factor	100	236	303
4206	2	195	344	emb 218852 SACF	S. aureus gene for clumping factor	95	85	150
4208	1	108	314	emb X58434 SAPD	S. aureus pdhA, pdhC and pdhD genes for pyruvate decarboxylase, dihydroliipoamide acetyltransferase and dihydroliipoamide dehydrogenase	89	76	207
4216	1	656	330	emb X58434 SAPD	S. aureus pdhA, pdhC and pdhD genes for pyruvate decarboxylase, dihydroliipoamide acetyltransferase and dihydroliipoamide dehydrogenase	98	326	327
4226	1	594	298	gb U11530	Staphylococcus aureus transfer RNA sequence with two rRNAs	97	132	297
4260	1	216	383	gb U11784	Staphylococcus aureus methicillin-resistant ATCC 33952 clone RNNV40 16S-23S rRNA spacer region	83	141	168
4272	1	325	179	emb X248003 SADN	S. aureus gene for DNA polymerase III	100	164	177
4276	1	4	177	emb X16457 SAST	Staphylococcus aureus gene for staphylocoagulase	99	150	174
4277	1	1	270	emb X64172 SARP	S. aureus rplL, rpoB(rif) and rpoC genes for ribosomal protein L7/L12, hypothetical protein ORF202, DNA-directed RNA polymerase beta & beta' chains	99	265	270
4282	1	691	377	emb X64172 SARP	S. aureus rplL, rpoB(rif) and rpoC genes for ribosomal protein L7/L12, hypothetical protein ORF202, DNA-directed RNA polymerase beta & beta' chains	98	282	315
4291	1	379	191	emb X64172 SARP	S. aureus rplL, rpoB(rif) and rpoC genes for ribosomal protein L7/L12, hypothetical protein ORF202, DNA-directed RNA polymerase beta & beta' chains	99	183	189
4295	1	3	329	emb X16457 SAST	Staphylococcus aureus gene for staphylocoagulase	94	144	327
4313	1	435	280	gb U11530	Staphylococcus aureus transfer RNA sequence with two rRNAs	100	94	156
4315	1	3	185	gb J03479	S. aureus enzyme III-lac (lacF), enzyme II-lac (lacE), and phospho-beta-galactosidase (lacG) genes, complete cds	100	158	183
4315	2	101	310	gb J03479	S. aureus enzyme III-lac (lacF), enzyme II-lac (lacE), and phospho-beta-galactosidase (lacG) genes, complete cds	98	75	210
4327	1	1	294	gb U11530	Transposon Tn5404 and insertion sequences IS1181 and IS1182 (Iron) Staphylococcus aureus) DNA	98	294	294
4350	1	603	319	gb U02910	Staphylococcus aureus ATCC 25923 16S rRNA gene, partial sequence	100	116	285
4364	1	3	146	emb X64172 SARP	S. aureus rplL, rpoB(rif) and rpoC genes for ribosomal protein L7/L12, hypothetical protein ORF202, DNA-directed RNA polymerase beta & beta' chains	95	140	144
4388	1	167	310	emb X62992 SAPN	S. aureus fnbB gene for fibronectin binding protein B	73	119	144

TABLE 1

S. aureus - Coding regions containing known sequences

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	percent ident	HSP nt length	ORF nt length
4401	1	2	313	emb X62992 SAFN	S.aureus fnbB gene for fibronectin binding protein B	97	243	312
4421	1	36	281	dbj D13572 STA7	Staphylococcus aureus rna gene for 23S ribosomal RNA	100	112	246
4426	1	3	293	emb Z18852 SACF	S.aureus gene for clumping factor	85	185	291
4428	1	493	248	emb X64172 SARP	S.aureus rplL, rpoB(rif) and rpoC genes for ribosomal protein L7/L12, hypothetical protein ORF202, DNA-directed RNA polymerase beta & beta' chains	100	139	246
4462	1	2	271	emb X64172 SARP	S.aureus rplL, rpoB(rif) and rpoC genes for ribosomal protein L7/L12, hypothetical protein ORF202, DNA-directed RNA polymerase beta & beta' chains	99	270	270
4466	1	1	240	emb Z18852 SACF	S.aureus gene for clumping factor	99	231	240
4469	1	1	312	gb J03479	S.aureus enzyme III-lac (lacF), enzyme II-lac (lacE), and phospho-beta-galactosidase (lacG) genes, complete cds	99	265	312
4485	1	3	263	gb L43098	Transposon Tn5404 and insertion sequences IS1181 and IS1182 (from Staphylococcus aureus) DNA	98	259	261
4492	1	74	400	gb M86227	Staphylococcus aureus DNA gyrase B subunit (gyrB) RecF homologue (recF) and DNA gyrase A subunit (gyrA) gene, complete cds	85	104	327
4497	1	515	269	emb Z18852 SACF	S.aureus gene for clumping factor	99	213	267
4529	1	2	172	emb X64172 SARP	S.aureus rplL, rpoB(rif) and rpoC genes for ribosomal protein L7/L12, hypothetical protein ORF202, DNA-directed RNA polymerase beta & beta' chains	100	151	171
4547	1	1	300	emb X62992 SAFN	S.aureus fnbB gene for fibronectin binding protein B	100	157	300
4554	1	318	160	emb Z18852 SACF	S.aureus gene for clumping factor	84	126	159
4565	1	9	227	emb Z18852 SACF	S.aureus gene for clumping factor	84	213	219
4569	1	79	222	emb Z18852 SACF	S.aureus gene for clumping factor	98	127	144
4608	1	22	216	emb X58434 SAPO	S.aureus pdhA, pdhC and pdhD genes for pyruvate decarboxylase, dihydrolipoamide acetyltransferase and dihydrolipoamide dehydrogenase	92	168	195
4616	1	464	234	emb Z18852 SACF	S.aureus gene for clumping factor	86	169	231
4623	1	105	302	gb J04151	S.aureus fibronectin-binding protein (fnbA) mRNA, complete cds	99	152	198
4632	1	18	206	gb J03479	S.aureus enzyme III-lac (lacF), enzyme II-lac (lacE), and phospho-beta-galactosidase (lacG) genes, complete cds	98	183	189
4646	1	1	222	emb Z18852 SACF	S.aureus gene for clumping factor	84	100	222
4687	1	2	166	gb J04151	S.aureus fibronectin-binding protein (fnbA) mRNA, complete cds	98	156	165

TABLE 1

S. aureus - Coding regions containing known sequences

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	percent ident	HSP nt length	ORF nt length
4695	1	313	158	gb L14017	Staphylococcus aureus methicillin-resistance protein (mecR) gene and unknown ORF, complete cds	75	155	156
4703	1	1	153	emb X58434 SAPD	S.aureus pdhB, pdhC and pdhD genes for pyruvate decarboxylase, dihydrolipoamide acetyltransferase and dihydrolipoamide dehydrogenase	98	103	153

TABLE I

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
20	6	5089	4679	gi 511839	ORF1 [Staphylococcus bacteriophage phi 11]	100	100	411
149	3	2032	1577	gi 849703 B497	int gene activator RlnA - bacteriophage phi 11	100	100	456
149	5	2109	1912	gi 166161	Bacteriophage phi-11 int gene activator [Staphylococcus acterophage phi 11]	100	100	198
349	2	558	409	gi 166159	integrase (int) [Staphylococcus bacteriophage phi 11]	100	100	150
398	1	1372	707	gi 166159	integrase (int) [Staphylococcus bacteriophage phi 11]	100	99	666
398	2	783	1001	gi 455128	excisionase (xis) [Staphylococcus bacteriophage phi 11]	100	100	219
502	4	1914	1744	gi 1204912	H. influenzae predicted coding region H10660 [Haemophilus influenzae]	100	71	171
849	1	2	262	gi 1373002	polyprotein [Bean common mosaic virus]	100	46	261
1349	1	277	140	gi 143359	protein synthesis initiation factor 2 (inf2) [Bacillus subtilis]	100	82	138
2880	1	21	308	gi 862933	protein kinase C inhibitor-I [Homo sapiens]	100	98	288
3085	1	428	216	gi 1354211	PER112-like protein [Bacillus subtilis]	100	100	213
4168	2	571	398	gi 1354211	PER112-like protein [Bacillus subtilis]	100	100	174
331	1	2	247	gi 426673	nucS gene product [Staphylococcus carnosus]	98	95	246
207	2	1272	1463	gi 460259	enolase [Bacillus subtilis]	97	90	192
331	2	395	830	gi 361638	111 protein [Staphylococcus carnosus]	97	93	456
366	1	39	215	gi 166161	Bacteriophage phi-11 int gene activator [Staphylococcus acterophage phi 11]	97	95	177
680	3	718	936	gi 426473	nucS gene product [Staphylococcus carnosus]	97	97	219
1518	1	284	144	gi 1339950	large subunit of NMII-independent glutamate synthase [Plectononax horyanum]	97	79	141
157	1	321	518	gi 1022726	unknown [Staphylococcus haemolyticus]	96	88	198
205	33	16470	16147	gi 1165302	S10 [Bacillus subtilis]	96	91	324
3919	1	48	401	gi 971784	Clp-like ATP-dependent protease binding subunit [Bos taurus]	96	81	354
4133	1	830	417	gi 1022726	unknown [Staphylococcus haemolyticus]	96	84	414
4168	1	708	355	gi 1354211	PER112-like protein [Bacillus subtilis]	96	95	354
4207	1	312	157	gi 4602031	similar to triethylamine OH [Mycoplama capricolium] pir[S49950]S49950 probable trimethylamine dehydrogenase (EC 5.99.7) - Mycoplasma capricolium (S49950) (fragment)	96	86	156

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	arch gene name	% sim	% ident	length (nt)
4227	2	152	331	gi 871784	[Cip-like ATP-dependent protease binding subunit (Bos taurus)]	96	81	180
4416	1	570	286	gi 1022726	unknown [Staphylococcus haemolyticus]	96	84	285
22	1	858	430	gi 511070	[ureG (Staphylococcus xylosus)]	95	88	429
22	7	4362	4036	gi 581787	[urease gamma subunit (Staphylococcus xylosus)]	95	79	337
82	6	8794	9114	pir JC0008 JC00	[ribosomal protein S7 - Bacillus stearothermophilus]	95	83	321
154	9	9280	7838	gi 1334211	[pET112-like protein (Bacillus subtilis)]	95	92	1443
186	3	2798	2055	gi 1514656	[serine O-acetyltransferase (Staphylococcus xylosus)]	95	87	744
205	5	4406	4014	gi 142462	[ribosomal protein S11 (Bacillus subtilis)]	95	85	393
205	7	5017	4793	gi 142459	[initiation factor 1 (Bacillus subtilis)]	95	84	225
205	121	11365	10993	gi 1044974	[ribosomal protein L14 (Bacillus subtilis)]	95	93	375
259	5	7288	6644	ap P47995 VSEA	[HYPOTHETICAL PROTEIN IN SECA 5 REGION (ORF1) (FRAGMENT)]	95	85	645
302	3	795	1097	gi 40186	[homologous to E.coli ribosomal protein L27 (Bacillus subtilis)]	95	89	303
					[ribosomal protein (Bacillus subtilis)]			
					[L27 - Bacillus subtilis p P45657 RL27_BACSU 50S RIBOSOMAL PROTEIN L27 (BLJ0) (BLJ4)]			
310	1	579	1523	gi 1177684	[chorismate mutase (Staphylococcus xylosus)]	95	92	945
414	1	2	163	pir C48396 C483	[ribosomal protein L34 - Bacillus stearothermophilus]	95	90	163
4145	2	125	277	gi 1276841	[glutamate synthase (GOGAT) (Forphyra purpurea)]	95	86	151
22	2	1028	723	gi 511059	[UraF (Staphylococcus xylosus)]	94	91	306
22	5	5046	3310	gi 410516	[urease alpha subunit (Staphylococcus xylosus)]	94	85	1737
60	4	815	1372	gi 866116	[glucose kinase (Staphylococcus xylosus)]	94	87	558
205	18	110012	9536	gi 1044978	[ribosomal protein S8 (Bacillus subtilis)]	94	78	477
326	4	3378	2542	gi 557492	[dihydroxynaphthoic acid (DHNA) synthetase (Bacillus subtilis)]	94	85	837
					[dihydroxynaphthoic acid (DHNA) synthetase (Bacillus subtilis)]			
414	3	737	955	gi 467386	[thiophen and furan oxidation (Bacillus subtilis)]	94	77	219
426	3	2260	1823	gi 1263908	[putative (Staphylococcus epidermidis)]	94	87	438
534	1	2	355	gi 633650	[enzyme 11(mannitol) (Staphylococcus carnosus)]	94	84	354
1017	1	2	229	gi 149435	[putative (Lactococcus lactis)]	94	73	228
3098	1	310	184	gi 413952	[lipo-28d gene product (Bacillus subtilis)]	94	50	147

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start Int	Stop Int	Match accession	Match gene name	% sim	% ident	length (nt)
3232	1	630	316	gi11022725	unknown [Staphylococcus haemolyticus]	94	84	315
42	5	2089	2259	gi11022725	unknown [Staphylococcus haemolyticus]	93	81	171
101	2	1745	1383	gi1155345	ribosomal protein L33 - Bacillus stearothermophilus	93	82	363
205	24	12227	11865	gi1155345	arabinic efflux pump protein [Pseudomonas aeruginosa]	93	83	363
259	4	8291	5673	gi1155345	50S RIBOSOMAL PROTEIN L16	93	85	2619
275	1	2226	1114	gi1155345	IsaA protein [Staphylococcus carnosus]	93	86	1113
444	6	6207	5773	gi1155345	enzyme II (mannitol) [Staphylococcus carnosus]	93	81	435
491	1	152	622	gi1155345	unknown [Staphylococcus haemolyticus]	93	88	471
607	6	1674	2033	gi11022726	ribosomal protein L13 [Staphylococcus carnosus]	93	83	360
653	1	973	488	gi11022726	unknown [Staphylococcus haemolyticus]	93	77	486
1864	1	3	194	gi11022726	translation initiation factor IF (AA 1-172) [Bacillus stearothermophilus]	93	93	192
2597	1	28	300	gi1143390	ribosomal protein small subunit (Homo sapiens)	93	82	273
3232	2	907	596	gi11022725	carbamyl phosphate synthetase [Bacillus subtilis]	93	84	312
3761	2	754	621	gi11022725	unknown [Staphylococcus haemolyticus]	93	88	174
16	1	3	374	gi1142781	putative cytoplasmic protein; putative [Bacillus subtilis]	92	83	372
31	7	5915	6124	gi11136430	sp1137954 [UVR8_BACSU EXCINUCLEASE ABC SUBUNIT B (DNA PROTEIN) FRAGMENT]	92	46	210
56	19	126483	127391	gi11467401	KIAA0185 protein (Homo sapiens)	92	80	909
69	6	5882	6130	gi11530200	unknown [Bacillus subtilis]	92	53	249
145	3	2568	2038	gi11022725	trophoblastin [Ovis aries]	92	80	531
171	3	2760	2362	gi11517475	unknown [Staphylococcus haemolyticus]	92	86	399
205	12	7495	6962	gi1149189	D-amino acid transaminase [Staphylococcus haemolyticus]	92	85	534
205	19	10812	10255	gi11044976	secY gene product [Staphylococcus carnosus]	92	82	558
219	1	710	357	gi11303812	ribosomal protein L5 [Bacillus subtilis]	92	88	354
344	3	1575	1805	gi11405474	YqeV [Bacillus subtilis]	92	85	231
699	1	20	361	gi11413999	ICspC protein [Bacillus cereus]	92	81	342
1343	1	2	160	gi1145434 [A654]	lipa-75d gene product [Bacillus subtilis]	92	84	159
					ribosomal protein L19 - Bacillus stearothermophilus			

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
1958	1	524	264	gi 407908	[E]ecr [Staphylococcus xylosum]	92	80	261
3578	2	718	366	gi 1339950	[large subunit of NADH-dependent glutamate synthase [Plectonema boryanum]	92	78	333
3585	1	644	324	gi 1339950	[large subunit of NADH-dependent glutamate synthase [Plectonema boryanum]	92	81	321
3640	1	4	402	gi 1022726	[unknown [Staphylococcus haemolyticus]	92	81	399
4362	1	14	178	gi 450688	[hcdm gene of Ecopri gene product [Escherichia coli] pir[S38437]S38437 hcdm protein - Escherichia coli pir[S09629]S09629 hypothetical protein A - Escherichia coli (SUB 40-520)]	92	76	165
4446	1	358	182	gi 1022725	[unknown [Staphylococcus haemolyticus]	92	82	177
4549	1	462	232	gi 1022726	[unknown [Staphylococcus haemolyticus]	92	80	231
4626	1	3	224	gi 1022725	[unknown [Staphylococcus haemolyticus]	92	84	222
2	4	3980	4531	gi 53349	[Cdx [Bacillus subtilis]	91	74	552
28	1	2	1126	gi 1001376	[hypothetical protein [Synchocystis sp.]	91	78	1125
60	5	1354	1701	gi 1226043	[orf2 downstream of glucose kinase [Staphylococcus xylosum]	91	80	348
101	1	1989	1036	gi 150728	[arsenic efflux pump protein [Plasmid p1250]	91	80	954
187	2	412	1194	gi 142559	[ATP synthase alpha subunit [Bacillus megaterium]	91	79	783
205	22	11579	11298	gi 40149	[S17 protein (AA 1-87) [Bacillus subtilis]	91	83	282
206	7	8184	10262	gi 1072418	[glcA gene product [Staphylococcus carnosus]	91	83	2079
306	2	3885	2326	gi 143012	[ORP synthetase [Bacillus subtilis]	91	78	1560
306	3	5319	3826	gi 467399	[IMP dehydrogenase [Bacillus subtilis]	91	79	1494
310	3	2194	3207	gi 1177685	[ecpA gene product [Staphylococcus xylosum]	91	81	1014
343	4	2974	3150	gi 949974	[sucrose repressor [Staphylococcus xylosum]	91	82	177
480	3	1606	3042	gi 433991	[ATP synthase subunit beta [Bacillus subtilis]	91	85	1637
516	3	2026	1280	gi 143366	[adenylosuccinate lyase (Pur-B) [Bacillus subtilis] pir[C19336]W285D5 adenylosuccinate lyase (EC 4.3.2.2) - Bacillus subtilis]	91	79	747
552	1	1064	615	gi 297874	[fructose-bisphosphate aldolase [Staphylococcus carnosus] pir[A09943]A09943 fructose-bisphosphate aldolase (EC 4.1.2.13) - taphylococcus carnosus (strain TH300)]	91	79	450
637	1	1	1536	gi 143597	[CTP synthetase [Bacillus subtilis]	91	79	1536
859	1	21	359	gi 385178	[unknown [Bacillus subtilis]	91	66	339

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
1327	1	339	530	gi1496558	orfX [Bacillus subtilis]	91	71	192
2515	1	466	275	gi1511070	ureG [Staphylococcus xylosum]	91	85	192
2594	1	2	202	gi1146824	bota-catalonase [Escherichia coli]	91	75	201
3764	1	847	425	gi11022725	unknown [Staphylococcus haemolyticus]	91	78	423
4011	1	127	495	gi11022726	unknown [Staphylococcus haemolyticus]	91	75	369
4227	1	1	177	gi1296464	ATPase [Lactococcus lactis]	91	66	177
42	3	815	1033	gi1520401	catalase [Haemophilus influenzae]	90	86	219
51	8	3717	4607	gi1580899	OppF gene product [Bacillus subtilis]	90	74	891
129	3	5317	4001	gi1146206	glutamate dehydrogenase [Bacillus subtilis]	90	76	1317
164	17	16628	16933	gi14957661RS15	30S RIBOSOMAL PROTEIN S15 (BS18)	90	74	306
171	5	2983	2819	gi1517475	D-amino acid transaminase [Staphylococcus haemolyticus]	90	78	165
205	4	4497	3550	gi1142463	RNA polymerase alpha-core-subunit [Bacillus subtilis]	90	73	339
205	6	4748	4410	gi11044989	ribosomal protein S13 [Bacillus subtilis]	90	81	762
205	10	7165	6404	gi149189	IsaC gene product [Staphylococcus carnosus]	90	78	174
205	11	6645	6472	gi149189	IsaC gene product [Staphylococcus carnosus]	90	79	348
205	22	13692	13345	gi1786157	ribosomal protein S19 [Bacillus subtilis]	90	79	363
205	31	15858	15496	gi1165303	IsaC [Bacillus subtilis]	90	78	1251
280	5	7023	5773	gi1161380	IsaA [Staphylococcus epidermidis]	90	78	570
299	6	3378	3947	gi1467440	phosphoribosylpyrophosphate synthetase [Bacillus subtilis] gi140218 PRPP synthetase (AA-1-317) [Bacillus subtilis]	90	75	693
320	2	1025	1717	gi1312443	carbamoyl-phosphate synthase [glutamine-hydrolysing] [Bacillus aldolyticus]	90	80	189
330	4	1581	1769	gi1986963	beta-tubulin [Sporidobolus parvovirus]	90	77	432
369	1	954	523	gi1534762IS347	U-serine dehydratase beta chain - Clostridium sp.	90	54	186
557	1	3	188	gi1511589	M. jannaschii predicted coding region M3624 [Methanococcus jannaschii]	90	73	534
663	2	667	1200	gi1143786	cryptophanyl-tRNA synthetase (EC 6.1.1.2) [Bacillus subtilis] gi1370481WDS tryptophan-tRNA ligase (EC 6.1.1.2) - Bacillus ubtilis	90	79	261
717	1	1	261	gi1143065	hubat [Bacillus stearothermophilus]	90	81	195
745	4	1059	865	gi1205433	M. influenzae predicted coding region M1190 [Haemophilus influenzae]	90	81	195

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% Ident	length (nt)
1007	1	386	565	gi1143366	adenylosuccinate lyase (PUB-3) [Bacillus subtilis] pif[C29326]W28505 adenylosuccinate lyase [EC 4.3.2.2] - Bacillus subtilis	90	77	180
1054	1	579	331	gi11033122	ORF_1729 [Escherichia coli]	90	50	249
1156	1	117	707	gi11477776	ClpP [Bacillus subtilis]	90	80	591
1100	1	408	205	gi11377831	unknown [Bacillus subtilis]	90	74	204
1253	1	1	462	gi140046	phosphoglucose isomerase A (AA 1-449) [Bacillus stearothermophilus] ir[S15936]NUB55A glucose-6-phosphate isomerase [EC 5.3.1.9] A - cillus stearothermophilus	90	75	462
2951	1	3	269	gi1144816	formyltetrahydrofolate synthetase (FTHFS) (tgp start codon) [EC 3.4.3] [Moorella thermoacetica]	90	76	267
3140	1	327	166	gi11070014	protein-dependent [Bacillus subtilis]	90	52	162
4594	1	3	233	gi1071784	Clp-like ATP-dependent protease binding subunit [Bos taurus]	90	76	231
87	1	1028	1250	gi11467327	unknown [Bacillus subtilis]	89	75	223
112	1	2	505	gi1153741	ATP-binding protein [Streptococcus mutans]	89	77	504
118	1	120	398	gi11303804	YqeO [Bacillus subtilis]	89	75	279
128	4	3545	3757	gi11460257	crucase phosphate isomerase [Bacillus subtilis]	89	84	213
164	12	11667	12755	gi1139954	IP2 (aa 1-741) [Bacillus stearothermophilus]	89	80	1089
205	13	7875	7405	gi11216338	ORF for L15 ribosomal protein [Bacillus subtilis]	89	76	471
205	32	16152	15823	gi11165303	L3 [Bacillus subtilis]	89	80	330
270	3	2407	2207	gi1141902	arsenate reductase [EC 1.1.1.1] - Staphylococcus xylosum plasmid pSX247	89	81	201
395	2	157	672	gi11520574	glucamate racemase [Staphylococcus haemolyticus]	89	80	516
494	1	3	839	gi11396259	protease [Staphylococcus epidermidis]	89	77	837
510	1	1	444	gi1140046	phosphoglucose isomerase A (AA 1-449) [Bacillus stearothermophilus] ir[S15936]NUB55A glucose-6-phosphate isomerase [EC 5.3.1.9] A - cillus stearothermophilus	89	74	444
615	1	2124	1210	gi11302812	YqeV [Bacillus subtilis]	89	74	915
841	1	18	341	gi11165303	L3 [Bacillus subtilis]	89	80	324
1111	1	352	813	gi1147146	thermonuclease [Staphylococcus intermedius]	89	70	462
1875	1	2	256	gi11205108	ATP-dependent protease binding subunit [Haemophilus influenzae]	89	82	255
2963	1	11	367	gi11467458	cell division protein [Bacillus subtilis]	89	83	357

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
3020	1	90	362	gi11239988	hypothetical protein [Bacillus subtilis]	89	66	273
3565	1	2	400	gi11256635	dihydroxy-acid dehydratase [Bacillus subtilis]	89	75	399
3586	1	105	314	gi1580832	ATP synthase subunit gamma [Bacillus subtilis]	89	82	210
3629	1	794	399	gi11009366	Respiratory nitrate reductase [Bacillus subtilis]	89	78	396
3688	1	2	400	gi11146206	glutamate dehydrogenase [Bacillus subtilis]	89	75	399
3699	1	794	399	gi11139950	large subunit of NADH-dependent glutamate synthase [Plectonema boryanum]	89	75	396
4016	1	428	216	gi11009366	Respiratory nitrate reductase [Bacillus subtilis]	89	71	213
4177	1	471	301	gi11149426	putative [Lactococcus lactis]	89	76	171
4436	1	601	302	gi11022725	unknown [Staphylococcus haemolyticus]	89	80	300
4635	1	320	162	gi11022725	unknown [Staphylococcus haemolyticus]	89	73	159
2	2	1310	2676	gi1520754	putative [Bacillus subtilis]	88	76	1347
42	2	468	848	sp1942321	CATALASE [EC 1.11.1.6]	88	76	381
53	5	6389	4722	gi1474177	alpha-D-1,4-glucosidase [Staphylococcus xylosus]	88	80	1668
56	16	18018	18617	gi1467411	recombination protein [Bacillus subtilis]	88	77	600
60	3	376	843	gi1666116	glucose kinase [Staphylococcus xylosus]	88	77	468
70	2	1583	1245	gi144095	replication initiator protein [Listeria monocytogenes]	88	74	339
82	8	11514	12719	pir1406631A606	translation elongation factor Tu - Bacillus subtilis	88	79	1206
103	7	4199	4391	gi1167181	serine/threonine kinase receptor [Brassica napus]	88	77	213
114	8	7732	8232	gi11022726	unknown [Staphylococcus haemolyticus]	88	72	501
118	2	308	2011	gi11303804	YqoQ [Bacillus subtilis]	88	77	1704
141	3	657	1136	gi11405446	transketolase [Bacillus subtilis]	88	72	480
148	7	5871	6116	gi11118002	dihydropteroate synthase [Staphylococcus haemolyticus]	88	78	246
165	3	1428	2231	gi140053	phenylalanyl-tRNA synthetase alpha subunit [Bacillus subtilis] tr S11730 YFBSA phenylalanine-tRNA ligase [EC 6.1.1.20] alpha ein - Bacillus subtilis	88	80	804
205	28	135027	14185	gi11165306	L2 [Bacillus subtilis]	88	82	843
225	1	1569	898	gi11303840	YufS [Bacillus subtilis]	88	78	672
235	1	2	1975	gi1452309	valyl-tRNA synthetase [Bacillus subtilis]	88	76	1974

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
339	3	2060	1566	gi11118002	dihydropterate synthase (Staphylococcus haemolyticus)	88	73	495
443	4	4325	2928	gi1558559	pyrimidine nucleoside phosphorylase (Bacillus subtilis)	88	73	1398
532	1	3	419	gi143797	valyl-tRNA synthetase (Bacillus stearothermophilus) ap1p1931SV_BACST VALYL-TRNA SYNTHETASE (EC 6.1.1.9) VALINE--TRNA LIGASE (VALRS)	88	78	417
534	3	2504	2968	gi1153049	mannitol-specific enzyme-III (Staphylococcus carnosus) p1rJ00088J00088 phosphotransferase system enzyme II (EC 7.1.49). mannitol-specific factor III - Staphylococcus carnosus ap1p17876PTMA_STACA PTS SYSTEM, MANNITOL-SPECIFIC IIA COMPONENT EIIA-MTU (88	82	465
705	2	584	399	gi1710018	nitrite reductase (nirB) (Bacillus subtilis)	88	70	186
1000	2	1824	1309	gi1102726	unknown (Staphylococcus haemolyticus)	88	78	516
1299	1	587	324	gi1401786	phosphomannomutase (Mycoplasma pirum)	88	55	264
1341	2	170	400	gi139963	ribosomal protein L20 (AA 1-119) (Bacillus stearothermophilus) Lr1503148150820 ribosomal protein L20 - Bacillus stearothermophilus	88	82	231
1386	1	41	214	gi184715418471	signal recognition particle 54K chain homolog Fth - Bacillus subtilis	88	71	174
1386	2	183	533	gi184715418471	signal recognition particle 54K chain homolog Fth - Bacillus subtilis	88	73	351
2849	1	704	399	gi1535350	CodX (Bacillus subtilis)	88	73	306
2884	1	5	169	gi1218277	O-acetylserine(thiol) lyase (Spinacia oleracea)	88	70	165
3015	1	1	138	gi1491083	dihydroxyacetone kinase (Citrobacter freundii)	88	67	138
3089	1	3	152	gi1606055	ORF_1746 (Escherichia coli)	88	88	150
3917	1	817	410	gi1143378	pyruvate decarboxylase (E-1) beta subunit (Bacillus subtilis)	88	77	408
4199	1	680	342	gi11405454	aconitase (Bacillus subtilis)	88	82	339
4201	1	736	369	gi1515938	glutamate synthase (ferredoxin) (Synecocystis sp.) p1r[S46957]S46957 glutamate synthase (ferredoxin) (EC 1.4.7.1) - Synecocystis sp.	88	84	366
4274	1	1	336	gi1515938	glutamate synthase (ferredoxin) (Synecocystis sp.) p1r[S46957]S46957 glutamate synthase (ferredoxin) (EC 1.4.7.1) - Synecocystis sp.	88	84	336
4308	1	794	399	gi1146206	glutamate dehydrogenase (Bacillus subtilis)	88	71	396
2	5	4570	6000	gi1535350	CodX (Bacillus subtilis)	87	70	1431
52	8	6781	6482	gi11064791	function unknown (Bacillus subtilis)	87	66	300

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
73	3	1584	2480	gi1142992	glycerol kinase (gpk) (EC 2.7.1.30) [Bacillus subtilis] pit[B45866]B45868 glycerol kinase (EC 2.7.1.30) - Bacillus subtilis sp[P18157]GLPK_BACSU GLYCEROL KINASE (EC 2.7.1.30) (ATP:GLYCEROL -PHOSPHOTRANSFERASE) (GLYCEROKINASE) (GK)	87	72	897
98	12	8813	9100	gi1467433	unknown [Bacillus subtilis]	87	62	288
124	4	4265	2988	gi1556886	serine hydroxymethyltransferase [Bacillus subtilis] pit[S49363]S49363 serine hydroxymethyltransferase - Bacillus ubtilis	87	77	1278
124	6	4457	4032	gi1556883	unknown [Bacillus subtilis]	87	66	426
148	5	3741	4559	gi1467460	unknown [Bacillus subtilis]	87	70	819
164	10	12710	13810	gi1399554	PF2 (aa 1-741) [Bacillus stearothermophilus]	87	72	1101
177	2	1104	2126	gi1467385	unknown [Bacillus subtilis]	87	78	1023
199	1	1982	1158	gi1143527	iron-sulfur protein [Bacillus subtilis]	87	77	825
199	2	4717	2933	pit[A27763]A277	succinate dehydrogenase (EC 1.3.99.1) flavoprotein - Bacillus subtilis	87	80	1785
205	23	111782	11543	gi11044972	ribosomal protein L29 [Bacillus subtilis]	87	74	240
205	25	113275	12607	gi1165309	S3 [Bacillus subtilis]	87	75	669
222	1	2033	1107	gi1177249	rec23 gene product [Bacillus subtilis]	87	70	527
236	3	1635	1333	gi1146198	ferredoxin [Bacillus subtilis]	87	80	303
246	5	2585	2292	gi1467373	ribosomal protein S18 [Bacillus subtilis]	87	77	294
260	2	4189	3422	gi1161382	IceC [Staphylococcus epidermidis]	87	72	768
320	3	1696	2391	gi1312443	carbamoyl-phosphate synthase (glutamine-hydrolyzing) [Bacillus aldolyticus]	87	80	696
380	4	1165	1383	gi1142570	ATP synthase c subunit [Bacillus firmus]	87	80	219
414	4	900	1073	gi1467386	thiophen and furan oxidation [Bacillus subtilis]	87	77	174
425	2	1003	794	gi11046166	pullin repressor [Mycoplasma genitalium]	87	69	210
448	1	1255	722	gi1405134	acetate kinase [Bacillus subtilis]	87	75	534
480	1	1	711	gi1142559	ATP synthase alpha subunit [Bacillus megaterium]	87	79	711
481	1	2	352	sp1006797IKU1_B	S05 RIBOSOMAL PROTEIN L1 (BL1)	87	72	351
677	2	359	955	gi1460911	fructose-bisphosphate aldolase [Bacillus subtilis]	87	78	597
677	3	934	1284	gi1460911	fructose-bisphosphate aldolase [Bacillus subtilis]	87	78	351
876	1	3	452	gi1146247	asparaginyl-tRNA synthetase [Bacillus subtilis]	87	79	450

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
1376	1	426	214	gi11065555	F46H6.4 gene product [Caenorhabditis elegans]	87	75	213
2206	1	3	374	gi1215098	ecolionase [Bacteriophage 156a]	87	72	372
2938	1	3	290	gi1508979	GTP-binding protein [Bacillus subtilis]	87	69	288
3081	2	126	308	gi1467399	1MP dehydrogenase [Bacillus subtilis]	87	72	183
3535	1	3	401	gi11405454	aconitase [Bacillus subtilis]	87	80	399
4238	1	547	275	gi1603769	lutu protein, urocanase [Bacillus subtilis]	87	73	273
4	8	10427	8736	gi1603769	lutu protein, urocanase [Bacillus subtilis]	86	72	1692
22	6	4190	3738	gi1410515	urease beta subunit [Staphylococcus xylosum]	86	73	453
54	2	2480	1572	gi1289287	UDP-glucose pyrophosphorylase [Bacillus subtilis]	86	70	909
124	3	2336	1713	gi1556887	uracil phosphoribosyltransferase [Bacillus subtilis] pir S49364 S49364	86	74	624
148	3	1349	3448	gi1467458	cell division protein [Bacillus subtilis]	86	75	2100
148	4	3638	3859	gi1467460	unknown [Bacillus subtilis]	86	73	222
152	3	1340	2086	gi1377835	pyruvate decarboxylase E-1 alpha subunit [Bacillus subtilis]	86	75	747
164	18	17347	19467	gi1184680	polynucleotide phosphorylase [Bacillus subtilis]	86	72	2121
180	2	554	1159	gi1143467	ribosomal protein S4 [Bacillus subtilis]	86	80	606
205	3	2966	3592	gi1142464	ribosomal protein L17 [Bacillus subtilis]	86	77	375
205	26	13364	12990	gi140107	ribosomal protein L22 [Bacillus stearothermophilus] ir S10612 S10612	86	75	375
246	7	3463	3140	gi1467375	ribosomal protein S6 [Bacillus subtilis]	86	70	324
299	3	1196	1540	gi139656	apoVG gene product [Bacillus megaterium]	86	70	345
299	7	3884	4345	gi1467440	phosphoribosylpyrophosphate synthetase [Bacillus subtilis] gi140218 PRPP synthetase (AA 1-317) [Bacillus subtilis]	86	78	462
304	5	2170	2523	gi1666983	putative ATP binding subunit [Bacillus subtilis]	86	65	354
310	2	1487	1678	gi1177684	chorismate mutase [Staphylococcus xylosum]	86	71	192
337	5	2086	3405	gi1487434	isocitrate dehydrogenase [Bacillus subtilis]	86	78	1320
339	2	1489	1109	gi1118003	dihydropyrimidin aldolase [Staphylococcus haemolyticus]	86	77	381
358	2	2124	3440	gi1146219	38.2% of identity to the Escherichia coli GTP-binding protein Era; putative [Bacillus subtilis]	86	73	1317

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
404	2	1015	2058	gi 1303817	YqfA (Bacillus subtilis)	86	78	1044
581	2	661	452	gi 40056	phoP gene product (Bacillus subtilis)	86	71	210
642	2	338	1075	gi 1176399	ispF (Staphylococcus epidermidis)	86	72	738
770	1	622	347	gi 143328	phoP protein (put.); putative (Bacillus subtilis)	86	69	276
865	1	1777	890	gi 1146247	asparaginyl-tRNA synthetase (Bacillus subtilis)	86	74	888
868	2	963	1133	gi 1002911	transmembrane protein (Saccharomyces cerevisiae)	86	69	171
904	1	1	162	gi 1303912	YqfW (Bacillus subtilis)	86	72	162
989	1	35	433	gi 1303993	YqfL (Bacillus subtilis)	86	76	399
1212	1	296	150	gi 1414014	lipA-90D gene product (Bacillus subtilis)	86	70	147
1323	1	2	148	gi 40041	pyruvate dehydrogenase (lipoamide) (Bacillus stearothermophilus) - Bacillus stearothermophilus - Bacillus stearothermophilus	86	75	147
3085	2	540	310	gi 1354211	PEP112-like protein (Bacillus subtilis)	86	86	231
1047	1	1	228	gi 296464	ATPase (Lactococcus lactis)	86	63	228
4487	1	476	240	gi 1022726	unknown (Staphylococcus haemolyticus)	86	73	237
4583	1	372	187	gi 1022725	unknown (Staphylococcus haemolyticus)	86	79	186
25	5	4287	5019	gi 1502421	3-ketoacyl-acyl carrier protein reductase (Bacillus subtilis)	85	64	753
56	21	30627	29395	gi 1408507	pyrimidine nucleoside transport protein (Bacillus subtilis)	85	69	1211
68	2	332	1192	gi 467376	unknown (Bacillus subtilis)	85	74	861
73	2	880	1707	gi 142992	glycerol kinase (gpk) (EC 2.7.1.30) (Bacillus subtilis) pifB45868B45869 glycerol kinase (EC 2.7.1.30) - Bacillus subtilis ap18157[GLPK_BACSU] GLYCEROL KINASE (EC 2.7.1.30) (ATP:GLYCEROL -PHOSPHOTRANSFERASE) (GLYCEROKINASE) (GK)	85	72	828
106	4	1505	3490	gi 143766	[thrSV] (EC 6.1.1.3) (Bacillus subtilis)	85	74	1986
128	2	1153	2202	gi 311924	glyceraldhyde-3-phosphate dehydrogenase (Clostridium pasteurianum) pifB45868B45869 Clostridium pasteurianum	85	75	1050
129	4	6466	5252	gi 1064807	[ORTHINE AMINOTRANSFERASE (Bacillus subtilis)]	85	73	1215
138	6	3475	5673	gi 1072419	glcB gene product (Staphylococcus carnosus)	85	74	2199
185	1	2	169	gi 467385	unknown (Bacillus subtilis)	85	65	168

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
205	15	8624	8106	gi 1044981	ribosomal protein S5 (Bacillus subtilis)	85	75	519
205	20	10328	10596	gi A02819 RSBS	ribosomal protein L24 - Bacillus stearothermophilus	85	72	333
220	6	6490	6101	gi 48980	secA gene product (Bacillus subtilis)	85	66	390
231	4	4877	3159	gi 1002520	mutS (Bacillus subtilis)	85	70	1719
243	9	8013	8783	gi 414011	lpa-87r gene product (Bacillus subtilis)	85	72	771
249	2	5894	3186	gi 1405454	aconitase (Bacillus subtilis)	85	73	2709
302	1	140	475	gi 40173	homolog of E. coli ribosomal protein L21 (Bacillus subtilis) ir S18439 S18439 Ribosomal protein L21 - Bacillus subtilis p P28908 RL21_BACSU 50S RIBOSOMAL PROTEIN L21 (BL20)	85	72	336
333	1	5445	2968	gi 442360	ClpC adenosine triphosphatase (Bacillus subtilis)	85	69	2478
364	6	6082	8196	gi 871784	Clp-like ATP-dependent protease binding subunit [Bos taurus]	85	68	2115
448	2	1992	1339	gi 405134	acetate kinase (Bacillus subtilis)	85	68	654
747	1	1251	853	gi 1373157	orf-X; hypothetical protein: Method: conceptual translation supplied by author (Bacillus subtilis)	85	73	399
866	2	159	467	gi 541768	hemin permease (Yersinia enterocolitica)	85	55	309
1049	1	1208	606	gi 847154 n471	signal recognition particle 54K chain homolog F/h - Bacillus subtilis	85	71	603
1163	1	816	409	gi 304155	diaminopimelate decarboxylase (Bacillus methanolicus) sp P41023 DCDA_BACHT DIAMINOPIMELATE DECARBOXYLASE (EC 4.1.1.20) DAP DECARBOXYLASE	85	62	408
1924	1	487	251	gi 215098	excisionase (Bacteriophage 154a)	85	73	237
2932	1	776	390	gi 1041099	Pyruvate Kinase (Bacillus licheniformis)	85	71	387
3030	1	3	275	gi 42370	pyruvate formate-lyase (AA 1-760) (Echerichia coli) ir S01788 S01788 formate C-acetyltransferase (EC 2.3.1.54) - Echerichia coli	85	74	273
3111	1	595	299	gi 63568	limb-deformity protein (Callus gallus)	85	85	297
3778	1	630	316	gi 391840	beta-subunit of HGT (Pseudomonas fragi)	85	67	315
3835	1	1	387	gi 1204472	type I restriction enzyme Ecor124/3 I M protein (Haemophilus influenzae)	85	56	387
4042	1	3	386	gi 18178	formate acetyltransferase (Chlamydomonas reinhardtii) ir S24997 S24997 formate C-acetyltransferase (EC 2.3.1.54) - Chlamydomonas reinhardtii	85	70	384
4053	1	35	340	gi 1204472	type I restriction enzyme Ecor124/3 I M protein (Haemophilus influenzae)	85	56	306
4108	1	2	183	gi 1072418	glcA gene product (Staphylococcus carnosus)	85	61	180
4300	1	575	330	gi 151932	fructose enzyme II (Rhodospirillum rubrum)	85	59	246

TABLE 2

S. aureus - putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
4392	1	627	355	gi 1022725	unknown [Staphylococcus haemolyticus]	85	74	273
4408	1	2	235	gi 871784	Clp-like ATP-dependent protease binding subunit [Bos taurus]	85	62	234
4430	1	578	291	gi 1003166	Respiratory nitrate reductase [Bacillus subtilis]	85	68	288
4555	1	2	253	gi 450688	hadh gene of Ecoprf1 gene product [Escherichia coli] pfr[S3847]S3847 hadh protein [Escherichia coli] pfr[S09629]S09629 hypothetical protein A - Escherichia coli [S08 40-520]	85	52	252
4611	1	481	242	gi 1256635	dihydroxy-acid dehydratase [Bacillus subtilis]	85	65	240
4	10	10061	10591	gi 46982	load gene product [Staphylococcus epidermidis]	84	68	531
13	2	1348	1172	gi 142450	leuH protein [Bacillus subtilis]	84	56	177
16	4	1803	4652	gi 1277198	DNA repair protein [Deinococcus radiodurans]	84	67	2850
22	3	1535	1128	gi 511069	uref [Staphylococcus xylosum]	84	73	408
23	7	5055	5306	gi 603320	Yer082p [Saccharomyces cerevisiae]	84	61	252
53	11	11597	11145	gi 1303948	YqjW [Bacillus subtilis]	84	68	453
53	12	14059	12770	gi 143613	branched chain alpha-keto acid dehydrogenase E2 [Bacillus subtilis] gi 1303944 BmBB [Bacillus subtilis]	84	71	1270
70	1	1332	982	gi 66647	ORF (repE) [Staphylococcus aureus]	84	68	351
73	4	2512	4311	gi 142993	glycerol-3-phosphate dehydrogenase (gpd) (EC 1.1.99.5) [Bacillus subtilis]	84	74	1800
98	7	4324	6096	gi 467427	methionyl-tRNA-synthetase [Bacillus subtilis]	84	66	1773
100	9	9501	8680	gi 1340128	ORF1 [Staphylococcus aureus]	84	78	822
117	3	1934	3208	gi 1237019	Srb [Bacillus subtilis]	84	68	1275
148	6	4720	5670	gi 467462	cysteine synthetase A [Bacillus subtilis]	84	69	951
152	4	2084	2456	gi 143377	pyruvate decarboxylase (E-1) alpha subunit [Bacillus subtilis] pfr[S3678]S3678 pyruvate decarboxylase (lipoamide) (EC 1.2.4.1) lpha chain - Bacillus subtilis	84	70	393
169	7	1634	3861	gi 1001342	hypothetical protein [Synecocystis sp.]	84	66	228
171	4	2992	2657	gi 517475	D-amino acid transaminase [Staphylococcus haemolyticus]	84	71	336
186	6	6941	6216	gi 467475	unknown [Bacillus subtilis]	84	70	726
205	9	6261	5692	gi 216340	ORF for adenylate kinase [Bacillus subtilis]	84	71	570
224	2	915	1391	gi 288269	beta-fructofuranosidase [Staphylococcus xylosum]	84	70	477

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
251	1	92	388	gi 1303790	YgeI (Bacillus subtilis)	84	65	297
282	3	1526	2836	gi 143040	glutamate-1-semialdehyde 2,1-aminotransferase [Bacillus subtilis] pir D42728 D42728 glutamate-1-semialdehyde 2,1-aminotransferase (EC 4.3.8) - Bacillus subtilis	84	75	1311
307	5	3138	2959	gi 1070014	protein-dependent [Bacillus subtilis]	84	62	180
320	4	2343	4229	gi 143390	[carbamyl phosphate synthetase [Bacillus subtilis]	84	70	1887
372	1	3	296	gi 1022725	unknown [Staphylococcus haemolyticus]	84	70	294
411	2	2201	1341	gi 1256146	YbqQ (Bacillus subtilis)	84	65	861
439	1	3	392	gi 1046173	osmotically-inducible protein [Mycoplasma genitalium]	84	53	390
461	3	1362	2270	gi 40211	[threonine synthase (thrC) (AA 1-352) [Bacillus subtilis] tr A25364 A25364 threonine synthase (EC 4.2.99.2) - Bacillus btillis	84	69	909
487	1	3	299	gi 1144531	[integrin-like protein alpha Inlcp [Candida albicans]	84	46	297
491	2	624	905	pir S08564 R385	ribosomal protein S9 - Bacillus stearothermophilus	84	69	282
491	3	816	1033	pir S08564 R385	ribosomal protein S9 - Bacillus stearothermophilus	84	77	198
548	1	3	341	gi 411231	[ulacil permease [Bacillus caldolyticus]	84	74	339
728	2	2701	1748	gi 912445	DNA polymerase [Bacillus caldocalax]	84	68	954
769	1	3	257	gi 1510953	[cobalamin biosynthesis protein N [Methanococcus jannaschii]	84	38	255
954	1	308	156	gi 1403454	[aconitase [Bacillus subtilis]	84	57	151
957	1	3	395	gi 143402	[recombination protein (ttg start codon) [Bacillus subtilis] gi 1303923 RecW [Bacillus subtilis]	84	68	393
975	1	3	452	gi 885934	[ClpB [Synechococcus sp.]	84	70	450
1585	1	3	257	gi 510140	[ligandopeptidase F [Lactococcus lactis]	84	56	255
2954	1	3	323	gi 603769	[HutU protein, urocanase [Bacillus subtilis]	84	73	321
2996	1	650	348	gi 18178	[formate acetyltransferase [Chlamydomonas reinhardtii] tr S24997 S24997 formate C-acetyltransferase (EC 2.3.1.54) - Chlamydomonas reinhardtii	84	65	303
3766	1	717	375	gi 517205	[67 kDa Myosin-crossreactive streptococcal antigen [Streptococcus yogenes]	84	72	361
4022	1	2	169	gi 1146206	[glutamate dehydrogenase [Bacillus subtilis]	84	54	168
4058	1	620	312	gi 151932	[fructose enzyme II [Rhodobacter capsulatus]	84	71	309
4108	2	106	351	gi 1072418	[glcA gene product [Staphylococcus carnosus]	84	77	246

TABLE 2

B. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
4183	1	3	308	gi 603769	nutU protein, urochase [Bacillus subtilis]	84	72	306
4726	1	55	234	gi 146208	glutamate synthase large subunit (EC 2.6.1.53) [Escherichia coli] p1r/A29617/A29617 glutamate synthase (NADPH) (EC 1.4.1.13) large chain - Escherichia coli	84	73	180
22	4	2043	1576	gi 393297	urease accessory protein [Bacillus sp.]	83	64	468
53	13	14722	13745	gi 142612	branched chain alpha-keto acid dehydrogenase E1-beta [Bacillus subtilis]	83	68	978
57	16	13357	12872	gi 143132	lactate dehydrogenase (AC 1.1.1.27) [Bacillus caldolyticus] p1r/B29704/B29704 L-lactate dehydrogenase (EC 1.1.1.27) - Bacillus caldolyticus	83	66	486
66	3	3119	2274	gi 1303894	YqhM [Bacillus subtilis]	83	53	846
66	5	6118	4643	gi 1212730	YqhK [Bacillus subtilis]	83	68	1476
70	3	1864	1523	gi 14095	replication initiator protein [Listeria monocytogenes]	83	73	342
90	1	377	1429	gi 155571	alcohol dehydrogenase I (adhA) (EC 1.1.1.1) [Zymomonas mobilis] p1r/A35260/A35260 alcohol dehydrogenase (EC 1.1.1.1) - Zymomonas mobilis	83	70	1053
95	2	708	2162	nt 506381	phospho-beta-glucosidase [Bacillus subtilis]	83	70	1455
137	1	68	694	gi 467391	initiation protein of replication [Bacillus subtilis]	83	77	627
140	4	3209	2742	gi 634102	kdpB [Escherichia coli]	83	65	468
142	3	3468	2989	gi 1212776	lumazine synthase (b-subunit) [Bacillus amyloliquefaciens]	83	69	480
161	12	5749	6696	gi 903307	ORF75 [Bacillus subtilis]	83	64	948
164	9	9880	11070	gi 49316	ORF2 gene product [Bacillus subtilis]	83	66	1191
164	14	14148	14546	gi 580902	ORF6 gene product [Bacillus subtilis]	83	60	399
170	2	3144	2467	gi 520844	orf4 [Bacillus subtilis]	83	64	678
186	2	2029	1370	gi 289284	cysteineyl-L-tryptophan synthetase [Bacillus subtilis]	83	72	660
205	14	7822	7607	gi 216317	ORF for L30 ribosomal protein [Bacillus subtilis]	83	74	216
237	6	3683	4540	gi 1510488	[amidoglycyl-phosphate synthase (cyclase) [Methanococcus jannaschii]	83	60	858
301	1	985	638	gi 467419	unknown [Bacillus subtilis]	83	65	348
302	4	1421	2743	gi 508979	CRP-binding protein [Bacillus subtilis]	83	68	1323
321	4	3933	3571	gi 39843	[fumarate lyase (as 1-462) [Bacillus subtilis]	83	68	363
367	1	2	352	gi 1039479	ORF0 [Lactococcus lactis]	83	54	351

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
387	1	3	662	gi 806281	DNA polymerase I (Bacillus stearothermophilus)	83	70	660
527	2	916	1566	gi 396259	protease (Staphylococcus epidermidis)	83	67	651
533	1	355	179	gi 142455	alanine dehydrogenase (EC 1.4.1.1) (Bacillus stearothermophilus) pir B34261 B34261 alanine dehydrogenase (EC 1.4.1.1) - Bacillus stearothermophilus	83	66	177
536	4	1617	1438	gi 143366	adenylosuccinate lyase (Pur-8) (Bacillus subtilis); r[C29326]W28SDS adenylosuccinate lyase (EC 4.3.2.2) - Bacillus subtilis	83	67	180
652	1	2	859	gi 520753	DNA topoisomerase I (Bacillus subtilis)	83	72	858
774	2	200	361	gi 1522665	M. jannaschii predicted coding region M2EL28 (Methanococcus jannaschii)	83	58	162
897	1	120	296	gi 1064807	ORTHONINE AMINOTRANSFERASE (Bacillus subtilis)	83	76	177
1213	1	3	491	gi 289288	lexA (Bacillus subtilis)	83	67	489
2329	1	296	150	gi 143786	tryptophanyl-tRNA synthetase (EC 6.1.1.2) (Bacillus subtilis) pir J79481 WBS tryptophan-tRNA ligase (EC 6.1.1.2) - Bacillus subtilis	83	69	147
2973	1	649	326	gi 1109687	Prox (Bacillus subtilis)	83	58	324
1004	1	728	366	gi 482532	ORF_0284 (Escherichia coli)	83	65	363
3035	2	45	305	gi 1950062	hypothetical yeast protein 1 (Mycoplasma capricolum) pir S46578 S46578 hypothetical protein Mycoplasma capricolum SDC3 (fragment)	83	59	261
3906	1	67	309	gi 1353197	chloroquin reductase (Eubacterium acidaminophilum)	83	61	243
4458	1	540	271	gi 397526	clumping factor (Staphylococcus aureus)	83	78	270
4570	1	444	223	gi 1022726	unknown (Staphylococcus haemolyticus)	83	74	222
4654	1	97	261	gi 1072419	g1c8 gene product (Staphylococcus carnosus)	83	79	145
16	2	295	1191	gi 153854	juv402 protein (Streptococcus pneumoniae)	82	67	897
16	3	1193	1798	gi 153854	juv402 protein (Streptococcus pneumoniae)	82	70	606
38	32	9644	8724	gi 1204400	N-acetylneuraminidase lyase (Haemophilus influenzae)	82	58	921
42	4	988	2019	gi 841192	catalase (Bacteroides fragilis)	82	70	1032
51	6	2590	3489	gi 143607	sporulation protein (Bacillus subtilis)	82	69	900
56	11	11270	13925	gi 39431	glgU-1,6-glucosidase (Bacillus cereus)	82	60	1656
56	15	11763	18014	gi 467410	unknown (Bacillus subtilis)	82	66	342
61	2	881	3313	gi 143148	transfer RNA-Lau synthetase (Bacillus subtilis)	82	70	2433

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
82	7	5162	11318	gi 48240	elongation factor G (aa 1-691) (Thermus aquaticus thermophilus) p13528 EFWG translation elongation factor G - Thermus aquaticus p13535 EFG-THETA ELONGATION FACTOR G (EF-G)	82	64	2157
85	2	5470	3260	gi 143369	phosphoribosylformyl glycine synthetase II (PUB-Q) (Bacillus subtilis)	82	66	2211
102	6	3662	5380	gi 1256635	aldehyde dehydrogenase (Bacillus subtilis)	82	65	1719
117	4	3242	3493	gi 147154 A471	orf1 5' of rfh - Bacillus subtilis	82	53	252
128	6	4377	5933	gi 460258	phosphoglycerate mutase (Bacillus subtilis)	82	66	1557
129	2	1229	2182	gi 403373	glycerophosphoryl diester phosphodiesterase (Bacillus subtilis) p135725 S3725 glycerophosphoryl diester phosphodiesterase - acillus subtilis	82	62	954
170	1	2	1441	gi 1377831	unknown (Bacillus subtilis)	82	67	1440
177	1	3	1094	gi 467386	thiophen and furan oxidation (Bacillus subtilis)	82	65	1092
184	4	3572	4039	gi 153566	ORF (19K protein) (Enterococcus faecalis)	82	59	468
189	8	4455	4225	gi 1001878	CspL protein (Listeria monocytogenes)	82	73	231
206	19	21366	32070	gi 473916	lipopeptide antibiotics (turin A) (Bacillus subtilis) sp139144 LIP14_BACSU LIPOPEPTIDE ANTIBIOTICS TURIN A AND SURFACTIN BIOSYNTHESIS PROTEIN	82	50	660
221	2	805	1722	gi 517205	67 kDa Myosin-crossreactive streptococcal antigen (Streptococcus pyogenes)	82	63	918
223	4	3866	3651	gi 439619	Salmonella typhimurium 15200 insertion sequence from SAR17, artial.1. gene product (Salmonella typhimurium)	82	69	216
260	3	5207	4296	gi 1161381	Icib (Staphylococcus epidermidis)	82	61	912
315	3	4864	2855	gi 143397	guinol oxidase (Bacillus subtilis)	82	67	2010
321	10	8520	7945	gi 142981	ORF3: This ORF includes a region (aa23-103) containing a potential non-sulphur centre homologous to a region of Rhodospirillum rubrum nd Chromatium vinosum; putative (Bacillus stearothermophilus) p1350299 PQ0299 hypothetical protein 5 (gida 3' region) -	82	62	576
331	3	1055	1342	gi 436574	ribosomal protein L1 (Bacillus subtilis)	82	71	288
370	2	262	618	gi 1303793	Yqel (Bacillus subtilis)	82	59	357
404	4	3053	4024	gi 1303821	YqfE (Bacillus subtilis)	82	68	972
405	4	4440	3073	gi 1303913	YqhX (Bacillus subtilis)	82	67	1368
436	3	4096	2864	gi 149521	cryptophan synthase beta subunit (Lactococcus lactis) p135129 S3129 cryptophan synthase (EC 4.2.1.20) beta chain - lactococcus lactis subsp. lactis	82	67	1233

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
441	4	3394	2573	gi142952	glyceraldehyde-3-phosphate dehydrogenase [Bacillus tearothermophilus]	82	67	822
444	112	10415	11227	gi1204354	spore germination and vegetative growth protein [Haemophilus influenzae]	82	67	813
446	1	3	191	gi143387	aspartate transcarbamylase [Bacillus subtilis]	82	66	189
462	3	1007	1210	gi142521	deoxyribodipyrimidine photolyase [Bacillus subtilis] p1r[A37192]A37192 uvrB protein - Bacillus subtilis sp[P14951]UVRC_BACSU EXCINUCLEASE ABC SUBUNIT C.	82	64	204
537	1	1560	784	gi1853767	UDP-N-acetylglucosamine 1-carboxyvinyltransferase [Bacillus subtilis]	82	61	777
680	2	407	700	gi1426472	laeE gene product [Staphylococcus carnosus]	82	69	294
724	2	565	386	gi143373	phosphoribosyl aminimidazole carboxy formyl ormyltransferase/inosine monophosphate cyclohydrolase (PUR-H(2)) [Bacillus subtilis]	82	68	180
763	1	422	213	gi1467458	cell division protein [Bacillus subtilis]	82	35	210
818	1	564	283	gi1064787	function unknown [Bacillus subtilis]	82	69	282
858	1	175	1176	gi143043	uroporphyrinogen decarboxylase [Bacillus subtilis] p1r[B47045]B47045 uroporphyrinogen decarboxylase (EC 4.1.1.37) - Bacillus subtilis	82	71	1002
895	1	3	599	gi1027507	ATP binding protein [Borrelia burgdorferi]	82	72	597
939	1	10	399	gi1143795	transfer RNA-Tyr synthetase [Bacillus subtilis]	82	60	390
961	1	1	306	gi1577847	gamma-hemolysin [Staphylococcus aureus]	82	69	306
1192	1	307	155	gi1146974	NH3-dependent NAD synthetase [Escherichia coli]	82	71	153
1317	1	49	375	gi1407908	Elisec [Staphylococcus xylosum]	82	72	327
1341	1	1	150	gi139962	ribosomal protein L35 (AA 1-66) [Bacillus tearothermophilus]	82	68	150
2990	2	567	349	gi1534855	ATPase subunit epsilon [Bacillus tearothermophilus] sp[P42009]ATPE_BACST ATP SYNTHASE EPSILON CHAIN (EC 3.6.1.34)	82	47	219
3024	1	45	224	gi1467402	unknown [Bacillus subtilis]	82	64	180
3045	1	276	139	gi1467335	ribosomal protein L9 [Bacillus subtilis]	82	60	138
3045	2	558	400	gi1467335	ribosomal protein L9 [Bacillus subtilis]	82	82	159
3091	1	474	238	gi1469335	secA protein [Staphylococcus carnosus]	82	78	237
3107	1	416	210	gi1546918	orfY 3' of conk [Bacillus subtilis, E26, Peptide Partial, 140 aa] p1r[S43181]S43181 hypothetical protein Y - Bacillus subtilis sp[P40338]HAD_BACSU HYPOTHETICAL PROTEIN IN CONK 3-REGION (ORFY FRAGMENT)	82	64	207

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
4332	1	2	319	gi 42086	nitrate reductase alpha subunit [Escherichia coli] p P09152 NARO_ECOLI RESPIRATORY NITRATE REDUCTASE 1 ALPHA CHAIN [EC 7.99.4] (SUB 2-1247)	82	75	318
23	3	3275	2574	gi 1199573	spas [Staphylococcus sp.]	81	64	702
42	1	638	321	gi 466778	lysine specific permease [Escherichia coli]	81	59	318
48	5	4051	4350	gi 1045937	M. genitalium predicted coding region NC246 [Mycoplasma genitalium]	81	62	300
51	4	1578	2579	pir S16649 S166	octiAC protein - Bacillus subtilis	81	55	1002
53	2	354	1494	gi 1303961	VgJ [Bacillus subtilis]	81	67	1131
53	8	9419	7971	gi 146930	6-phosphogluconate dehydrogenase [Escherichia coli]	81	66	1449
54	9	10757	10119	gi 143016	permease [Bacillus subtilis]	81	65	639
54	10	13360	11786	gi 143015	gluconate kinase [Bacillus subtilis]	81	64	1575
57	17	13983	13366	pir A25805 A258	L-lactate dehydrogenase [EC 1.1.1.27] - Bacillus subtilis	81	74	618
81	2	2708	2217	gi 1222302	Nitro-related protein [Haemophilus influenzae]	81	54	492
86	1	745	374	gi 414017	ipa-93d gene product [Bacillus subtilis]	81	70	372
103	6	6438	4861	gi 971342	nitrate reductase beta subunit [Bacillus subtilis] sp P43176 NARH_BACSU NITRATE REDUCTASE BETA CHAIN [EC 1.7.99.4]	81	64	1578
120	15	10845	12338	gi 1524392	GbsA [Bacillus subtilis]	81	67	1494
128	5	3676	4413	gi 143319	crfase phosphate isomerase [Bacillus megaterium]	81	64	738
131	9	10308	9280	gi 299163	alanine dehydrogenase [Bacillus subtilis]	81	68	1029
143	6	6088	5471	gi 439819	[Salmonella typhimurium] IS200 insertion sequence from SARA17, artial.i. gene product [Salmonella typhimurium]	81	61	618
169	1	43	825	gi 897795	30S ribosomal protein [pediococcus acidilactici] sp P49668 RS2_PEDAC_30S RIBOSOMAL PROTEIN S2	81	65	783
230	1	450	226	gi 1125826	short region of weak similarity to tyrosine-protein kinase receptors in a fibronectin type III-like domain [Caenorhabditis elegans]	81	54	225
233	5	2000	2677	gi 467404	unknown [Bacillus subtilis]	81	63	678
241	2	3081	2149	gi 16510	succinate-CoA ligase (GDP-forming) [Arabidopsis thaliana] r S30579 S30579 succinate-CoA ligase (GDP-forming) [EC 6.2.1.4] phe chain - Arabidopsis thaliana (fragment)	81	69	933
256	1	1	981	pir S09411 S094	spoIIIE protein - Bacillus subtilis	81	65	981
259	3	3752	2691	sp P28367 P28367	PROBABLY PEPTIDE CHAIN RELEASE FACTOR 2 (RF-2) (FRAGMENT)	81	65	1062

TABLE 2

3. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
275	2	1728	3581	gi1726480	L-glutamine-D-fructose-6-phosphate amidotransferase [Bacillus subtilis]	81	68	1856
285	1	1466	735	gi1204844	H. influenzae predicted coding region H10594 [Haemophilus influenzae]	81	63	732
296	1	99	1406	gi1467328	adenylosuccinate synthetase [Bacillus subtilis]	81	67	1308
302	9	5590	5889	gi1147485	queA [Escherichia coli]	81	64	300
317	2	1137	1376	gi134961	resolvase [Transposon Tn917]	81	54	240
343	2	1034	1342	gi1405955	lyeD [Escherichia coli]	81	60	309
360	2	1404	2471	gi11204570	aspartyl-tRNA synthetase [Haemophilus influenzae]	81	67	1068
364	5	6251	5706	gi11204657	methylated-DNA-protein-cysteine methyltransferase [Haemophilus influenzae]	81	63	546
372	2	1707	1135	gi1467416	unknown [Bacillus subtilis]	81	65	573
392	1	43	603	pir1509411 S094	epoIII protein - Bacillus subtilis	81	65	561
404	9	5252	6154	gi1606745	Bex [Bacillus subtilis]	81	65	903
426	2	1727	1119	gi139453	Manganese superoxide dismutase [Bacillus caldotenax] tr[S22053]S22053 superoxide dismutase (EC 1.15.1.1) (Mn) - Bacillus licheniformis	81	66	609
440	7	5653	5889	gi1137083 C170	hypothetical protein II (compl 3' region) - Salmonella typhimurium (fragment)	81	57	237
625	3	1105	2070	gi11262360	protein kinase PknB [Mycobacterium leprae]	81	56	966
754	2	504	1064	gi11303902	YqjU [Bacillus subtilis]	81	71	561
842	1	86	430	gi11405446	transketolase [Bacillus subtilis]	81	68	345
953	1	798	400	gi11205429	dipeptide transport ATP-binding protein [Haemophilus influenzae]	81	57	399
961	2	252	401	gi1487686	synerghymenotropic toxin (Staphylococcus intermedius) pir[S44944]S44944 synerghymenotropic toxin - Staphylococcus intermedius	81	72	150
1035	1	1	189	gi11046138	H. genitalium predicted coding region MG423 [Mycoplasma genitalium]	81	43	189
1280	1	670	449	gi1559164	helicase [Autographa californica nuclear polyhedrosis virus] sp1P24307 V163.NPVAC HEUCASE	81	43	222
3371	1	68	241	gi11322245	mevalonate pyrophosphate decarboxylase [Rattus norvegicus]	81	62	174
3715	1	475	239	gi1537137	ORF_138 [Escherichia coli]	81	58	237
3908	3	2	325	gi1439619	[Salmonella typhimurium] IS200 insertion sequence from SARAI7, attial., gene product [Salmonella typhimurium]	81	68	324
3940	1	3	403	gi11296464	ATPase [Lactococcus lactis]	81	69	399

TABLE 2

B. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
3954	1	1	318	gi1224069	amidase [Moraxella catarrhalis]	81	68	318
4049	1	337	170	gi1603768	Hut1 protein, imidazole-5-propanate hydrolase [Bacillus subtilis] gi1603768 Hut1 protein, imidazole-5-propanate hydrolase [Bacillus subtilis]	81	68	168
4209	1	1	324	gi1403373	glycerophosphoryl diester phosphodiesterase [Bacillus subtilis] pir1537251 glycerophosphoryl diester phosphodiesterase - acillus subtilis	81	58	324
4371	1	627	322	gi1216677	indolepyruvate decarboxylase [Enterobacter cloacae] pir156013 indolepyruvate decarboxylase [EC 4.1.1.1] - nterobacter cloacae	81	72	306
4387	1	19	228	gi1460689	TVG [Thermactinomyces vulgaris]	81	59	210
4391	1	581	306	gi1524193	unknown [Mycobacterium tuberculosis]	81	67	276
4425	1	3	341	gi1143015	glucanase kinase [Bacillus subtilis]	81	66	339
9	1	1593	847	gi1064786	function unknown [Bacillus subtilis]	80	62	747
17	1	546	311	gi1559164	helicase [Autographa californica nuclear polyhedrosis virus] api124307/v143 NPVAC HELICASE	80	40	234
45	2	1159	2448	gi1109684	ProV [Bacillus subtilis]	80	63	1290
45	5	4032	4733	gi1109687	ProZ [Bacillus subtilis]	80	55	702
54	8	10266	9502	gi1563952	glucanase permease [Bacillus licheniformis]	80	62	765
62	12	8852	7545	gi1834655	Na/H antiporter system [Bacillus alcalophilus]	80	62	1308
62	14	8087	8683	gi1559713	ORF [Homo sapiens]	80	68	597
67	16	13781	14132	gi1305002	ORF_F356 [Escherichia coli]	80	65	342
70	13	11495	10296	gi11303995	YqkN [Bacillus subtilis]	80	64	1200
98	9	6336	7130	gi1467428	unknown [Bacillus subtilis]	80	68	795
98	10	7294	7833	gi1467430	unknown [Bacillus subtilis]	80	64	540
98	11	7820	8737	gi1467431	high level kasamycin resistance [Bacillus subtilis]	80	61	918
109	16	14154	14813	gi1580875	ipa-57d gene product [Bacillus subtilis]	80	63	660
112	15	14294	16636	gi1072361	pyruvate-formate lyase [Clostridium pasteurianum]	80	65	2343
139	1	1448	726	gi1506699	CapC [Staphylococcus aureus]	80	58	723
139	2	2179	1448	gi1506698	CapB [Staphylococcus aureus]	80	59	722
174	4	3271	2870	gi11146242	aspartate 1-decarboxylase [Bacillus subtilis]	80	61	402

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
177	3	2102	2842	gi1467385	unknown [Bacillus subtilis]	80	70	741
184	6	6124	5912	gi1161953	85-kDa surface antigen [Trypanosoma cruzi]	80	46	213
186	4	5368	3875	gi1289282	glutaryl-tRNA synthetase [Bacillus subtilis]	80	65	1494
205	30	15796	15140	gi140103	[ribosomal] protein L4 [Bacillus stearothermophilus]	80	66	657
207	1	140	1315	gi1460259	enolase [Bacillus subtilis]	80	61	1176
211	3	1078	1590	gi1410131	ORFX7 [Bacillus subtilis]	80	61	513
235	2	1962	2255	gi1143797	[valyl-tRNA synthetase [Bacillus stearothermophilus] sp. p1193], [SVV_BAC67 VALYL-TRNA SYNTHETASE (EC 6.1.1.5) VALINE--TRNA LIGASE) (VALRS)]	80	55	294
239	1	1	1263	gi1143000	proton glutamate symport protein [Bacillus stearothermophilus] pir1526247/1526247 glutamate/aspartate transport protein - Bacillus stearothermophilus	80	59	1263
272	5	2724	2461	gi1709993	hypothetical protein [Bacillus subtilis]	80	54	264
301	3	1446	1111	gi1467418	unknown [Bacillus subtilis]	80	58	336
310	4	5697	4501	gi1117686	lacC gene product [Staphylococcus xylosum]	80	67	1197
310	6	5258	7006	gi1348053	acetyl-CoA synthetase [Bacillus subtilis]	80	67	1749
310	7	7410	9113	gi1103865	formyl-tetrahydrofolate synthetase [Streptococcus mutans]	80	67	1704
325	3	1114	1389	gi1310125	outer capsid protein [Rotavirus sp.1]	80	40	276
337	1	1268	636	gi1537049	ORF_0470 [Escherichia coli]	80	55	633
374	2	929	1228	gi11405448	YneP [Bacillus subtilis]	80	70	300
375	5	3062	3331	gi1467448	unknown [Bacillus subtilis]	80	68	270
388	1	267	587	gi11064791	function unknown [Bacillus subtilis]	80	65	321
394	1	9	659	gi1304976	[matches P500017: ATP-GTP_A and P500301: EFACITOR_GTP; similar to longation factor G, TetM/TetO tetracycline-resistance proteins Escherichia coli]	80	65	651
456	1	625	1263	gi11145183	putative [Bacillus subtilis]	80	65	639
475	1	1	654	gi1288269	[beta-fructofuranosidase [Staphylococcus xylosum]	80	66	654
544	2	1449	2240	gi1529754	[apeC [Streptococcus pyogenes]	80	50	792
622	4	1633	1873	gi11461545	unknown [Mycobacterium tuberculosis]	80	65	249
719	1	1	1257	gi11064791	function unknown [Bacillus subtilis]	80	68	1257
739	1	107	838	gi11666983	putative ATP binding subunit [Bacillus subtilis]	80	61	732

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	Length (nt)
745	2	581	414	gi11511600	coenzyme PQQ synthesis protein III [Methanococcus jannaschii]	80	61	168
822	1	17	679	gi1410141	ORFX17 [Bacillus subtilis]	80	68	651
827	2	991	836	gi1205301	leukotoxin secretion ATP-binding protein [Haemophilus influenzae]	80	54	136
1044	1	3	149	gi160632	vp2 [Marburg virus]	80	55	147
1220	2	571	413	pirA61072 EPSC	gallicidarin precursor - Staphylococcus gallinarum	80	74	159
2519	1	75	275	gi147556	qpj [Escherichia coli]	80	45	201
2947	1	503	279	gi1184680	polynucleotide phosphorylase [Bacillus subtilis]	80	62	275
3120	1	2	226	gi1517205	67 kDa Myosin-crossreactive streptococcal antigen [Streptococcus yogenes]	80	65	225
3191	1	294	148	gi151259	HMG-CoA reductase (EC 1.1.1.88) [Pseudomonas mavalonii] pirA44756 A44756 hydroxymethylglutaryl-CoA reductase (EC 1.1.1.88) Pseudomonas sp.	80	59	147
3560	2	285	434	gi1217130	photosystem I core protein B [Synechococcus vulcanus]	80	70	150
3655	1	47	346	gi1415855	deoxyribose aldolase [Mycoplasma hominis]	80	56	300
3658	2	324	584	gi1551531	2-nitropropane dioxygenase [Willopsia saturnus]	80	54	261
3769	1	798	400	gi1339950	large subunit of NADH-dependent glutamate synthase [Plectonema boryanum]	80	68	399
3781	1	692	348	gi1166412	NADH-glutamate synthase [Medicago sativa]	80	62	345
3988	1	48	287	gi1204696	fructose-permease IIBC component [Haemophilus influenzae]	80	69	240
4030	1	571	287	gi11009366	respiratory nitrate reductase [Bacillus subtilis]	80	60	285
4092	1	547	275	gi1370207	orf6 [Lactobacillus sake]	80	69	273
4103	1	680	342	gi139956	IGlc [Bacillus subtilis]	80	65	339
4231	1	692	348	gi1289287	UDP-glucose pyrophosphorylase [Bacillus subtilis]	80	65	345
4265	1	595	299	gi1603768	HutI protein, imidazolone-5-propiolate hydrolase [Bacillus subtilis] gi1603768 HutI protein, imidazolone-5-propiolate hydrolase [Bacillus subtilis]	80	63	297
4504	1	498	250	gi1339950	large subunit of NADH-dependent glutamate synthase [Plectonema boryanum]	80	68	249
2	6	5998	6798	gi1535351	CodY [Bacillus subtilis]	79	63	801
4	7	8295	7051	gi1603768	HutI protein, imidazolone-5-propiolate hydrolase [Bacillus subtilis] gi1603768 HutI protein, imidazolone-5-propiolate hydrolase [Bacillus subtilis]	79	64	1245
25	6	5273	5515	pirA36728 A367	lacyl carrier protein - Rhizobium meliloti	79	65	243

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
59	2	1173	1424	gi 147923	chreonine dehydratase 2 [EC 4.2.1.16] [Escherichia coli]	79	75	252
60	1	1	204	gi 666115	orf1 upstream of glucose kinase [Staphylococcus xylosus] pir[52351][52351] hypothetical protein 1 - Staphylococcus xylosus	79	60	204
81	1	3002	1590	gi 466882	lppsl; B1486_C2.189 [Mycobacterium leprae]	79	64	1413
85	7	7023	6505	gi 143364	phosphoribosyl aminimidazole carboxylase I (PUR-E) [Bacillus subtilis]	79	60	519
89	6	3660	4554	gi 144906	product homologous to E.coli thiorodoxin reductase; J.Biol.Chem. 1988) 263:9015-9019, and to P52a protein of alkyl hydroperoxide oxidase from S.typhimurium; J.Biol.Chem. (1990) 265:10535-10540; pen reading frame A [Clostridium pasteurianum]	79	35	1107
102	11	7489	8571	gi 143093	ketol-acid reductoisomerase [Bacillus subtilis] sp p37253 ILVC-BACSU KETOL-ACID REDUCTOISOMERASE [EC 1.1.1.86] ACETOHYDROXY-ACID ISOMEROREDUCTASE) (ALPHA-KETO-BETA-HYDROXYLACIL EDUCOISOMERASE)	79	64	1083
102	14	11190	12563	gi 149428	putative [Lactococcus lactis]	79	65	1374
127	9	7792	9372	gi 458688	PrfC/RF3 [Dichelobacter nodosus]	79	68	1581
139	3	2540	3983	gi 506697	CapA [Staphylococcus aureus]	79	55	558
144	2	1644	1156	gi 1498296	peptide methionine sulfoxide reductase [Streptococcus pneumoniae]	79	47	489
148	2	529	1098	gi 467457	hypoxanthine-guanine phosphoribosyltransferase [Bacillus subtilis] gi 467457 hypoxanthine-guanine phosphoribosyltransferase [Bacillus subtilis]	79	59	570
150	3	965	591	gi 755602	unknown [Bacillus subtilis]	79	61	375
176	1	1039	587	gi 297874	fructose-bisphosphate aldolase [Staphylococcus carnosus] pir[A49943][A49943] fructose-bisphosphate aldolase [EC 4.1.2.13] - taphylococcus carnosus [strain TN100]	79	65	453
186	7	7584	6874	gi 1314298	ORF5, putative Sma protein; similar to Sma proteins from Haemophilus influenzae and Escherichia coli [Listeria monocytogenes]	79	64	711
205	16	8887	8498	gi 1044980	ribosomal protein L18 [Bacillus subtilis]	79	70	390
211	1	1	519	gi 1303994	YqkM [Bacillus subtilis]	79	62	519
223	2	4183	2801	gi 488430	alcohol dehydrogenase 2 [Entamoeba histolytica]	79	60	1383
243	8	8915	7896	gi 580883	lpa-88d gene product [Bacillus subtilis]	79	60	1020
279	4	3721	4329	gi 413930	lpa-6d gene product [Bacillus subtilis]	79	59	609
308	1	11	1393	gi 403372	glycerol 3-phosphate perase [Bacillus subtilis]	79	62	1383
307	3	2930	1925	gi 950062	hypothetical yeast protein 1 [Mycoplasma capricolum] pir[548578][548578] hypothetical protein - Mycoplasma capricolum SGC3 (fragment)	79	60	996

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match	match gene name	% sim	% ident	length (nt)
352	6	110106	8886	gi 216854	79	P47K [Pseudomonas chlororaphis]	79	59	1221
412	1	1153	578	gi 143177	79	putative [Bacillus subtilis]	79	51	576
481	3	621	1124	gi 786163	79	Ribosomal Protein L10 [Bacillus subtilis]	79	66	504
516	1	702	352	gi 805090	79	NisF [Lactococcus lactis]	79	48	351
525	2	2457	1426	gi 143371	79	phosphoribosyl aminimidazole synthetase (pur-M) [Bacillus subtilis] pirH39326 [ABSCC phosphoribosylformylglycinamide cyclo-ligase EC 6.3.3.1] - Bacillus subtilis	79	61	1032
538	4	3448	2825	gi 1370207	79	orf6 [Lactobacillus sakei]	79	67	624
570	1	2	421	gi 476160	79	arginine permease substrate-binding subunit [Listeria monocytogenes]	79	61	420
645	8	2663	3241	gi 153898	79	transport protein [Salmonella typhimurium]	79	62	579
683	1	75	374	gi 1064795	79	function unknown [Bacillus subtilis]	79	62	300
816	3	4700	3987	gi 1407784	79	orf-1; novel antigen [Staphylococcus aureus]	79	62	714
2929	1	3	401	gi 1524397	79	glycine betaine transporter OpuD [Bacillus subtilis]	79	61	399
2937	1	357	202	pir S52915 S529	79	nitrate reductase alpha chain - Bacillus subtilis [fragment]	79	58	156
2940	1	768	385	gi 145429	79	putative [Lactococcus lactis]	79	72	384
2946	1	570	286	gi 143267	79	2-oxoglutarate dehydrogenase (odhA; EC 1.2.4.2) [Bacillus subtilis]	79	61	285
2999	1	3	212	gi 710020	79	nitrite reductase (nirB) [Bacillus subtilis]	79	59	210
3022	1	514	332	gi 450686	79	3-phosphoglycerate kinase [Thermotoga maritima]	79	61	183
3064	1	3	314	gi 1204436	79	pyruvate formate-lyase [Haemophilus influenzae]	79	60	312
3083	1	2	220	gi 1149662	79	hydB gene product [Clostridium perfringens]	79	56	219
3126	1	701	411	gi 1339950	79	large subunit of NADH-dependent glutamate synthase [Plectonema boryanum]	79	55	291
3181	1	607	326	gi 1339950	79	large subunit of NADH-dependent glutamate synthase [Plectonema boryanum]	79	59	282
3345	1	3	476	gi 871784	79	Clp-like ATP-dependent protease binding subunit [Bos taurus]	79	63	474
3716	1	536	270	pir C16889 C168	79	leuB protein, inactive - Lactococcus lactis subsp. lactis (strain IL1403)	79	71	267
3724	2	159	401	gi 1009366	79	respiratory nitrate reductase [Bacillus subtilis]	79	64	243
3836	1	608	312	gi 1524193	79	unknown [Mycobacterium tuberculosis]	79	65	297
3941	1	2	334	gi 415855	79	deoxyribose aldolase [Mycoplasma hominis]	79	54	333
4113	1	3	341	gi 143015	79	gluconate kinase [Bacillus subtilis]	79	63	339

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
4501	1	406	209	gi1022726	unknown [Staphylococcus haemolyticus]	79	66	198
4612	1	2	236	gi1460889	TVC [Thermotomomyces vulgaris]	79	58	237
2	1	2	1213	gi1520753	DNA topoisomerase I [Bacillus subtilis]	78	64	1212
4	2	2266	1220	gi1216151	DNA polymerase (gene b; ttg start codon) [Bacteriophage SP02] gi1579197 SP02 DNA polymerase (aa 1-648) [Bacteriophage SP02] pifA21498 [DJBP52 DNA-directed DNA polymerase (EC 2.7.7) 7-phage P02]	78	72	1047
9	2	1340	1089	gi1064787	[function unknown [Bacillus subtilis]	78	57	252
32	8	6803	7702	gi1146974	NH3-dependent NAD synthetase [Escherichia coli]	78	63	900
36	4	2941	3138	gi1280503	glutamate permease [Escherichia coli]	78	53	198
53	15	17684	16221	gi11303941	Yqiv [Bacillus subtilis]	78	58	1464
57	14	10520	12067	gi1072418	glcA gene product [Staphylococcus carnosus]	78	65	1548
66	7	6798	5812	gi1212729	Yqbj [Bacillus subtilis]	78	67	987
67	4	4029	4376	gi1466612	inika [Escherichia coli]	78	71	348
91	9	10058	10942	gi1467380	stage 0 sporulation [Bacillus subtilis]	78	50	885
102	12	8574	10130	gi1149426	[putative [Lactococcus lactis]	78	61	1557
112	6	3540	4463	gi1854234	cydC gene product [Klebsiella oxytoca]	78	56	924
124	2	1884	1061	gi1405622	unknown [Bacillus subtilis]	78	60	828
130	3	1805	2260	gi1256636	[putative [Bacillus subtilis]	78	71	456
133	3	751	377	gi1168060	laab [Escherichia nidulans]	78	59	375
166	4	7125	6163	gi1451216	Mannosephosphate isomerase [Streptococcus mutans]	78	63	963
186	1	1586	795	gi1289284	cytateinyl-tRNA synthetase [Bacillus subtilis]	78	63	792
195	4	2749	2315	gi11353874	unknown [Rhodobacter capsulatus]	78	58	435
199	3	4279	3623	gi1143525	succinate dehydrogenase cytochrome b-558 subunit [Bacillus subtilis] pifA29843 [DEBSSC succinate dehydrogenase (EC 1.3.99.1) cytochrome 558 - Bacillus subtilis]	78	57	657
199	4	7209	5557	gi1142521	deoxyribodipyrimidine photolyase [Bacillus subtilis] pifA37192 [A37192 uvrB protein - Bacillus subtilis sp1495] [UVRC_BACSU EXCINUCLEASE ABC SUBUNIT C]	78	62	1653
223	3	1831	3523	gi1139596	[Escherichia coli 15200 insertion sequence from EC063, partial 1. ene product [Escherichia coli]	78	47	309

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
299	4	1865	2149	gi1467439	temperature sensitive cell division [Bacillus subtilis]	78	62	285
321	9	7734	7315	gi142979	[orf] is homologous to an ORF downstream of the spoF gene of E. coli; RPS [Bacillus stearothermophilus]	78	55	420
352	4	3714	3944	gi1349050	actin 1 [Pneumocystis carinii]	78	42	231
352	5	7592	6093	gi1903587	NADH dehydrogenase subunit 5 [Bacillus subtilis] ap[P39755]NDH5 [BACSU NADH DEHYDROGENASE SUBUNIT 5 (EC 1.6.5.3) NADH-UBIQUINONE OXIDOREDUCTASE CHAIN 5]	78	58	1500
376	1	2	583	gi1551693	dehydrobiotin synthase [Bacillus sphaericus]	78	34	582
424	2	1595	1768	gi1524117	alpha-acetolactate decarboxylase [Lactococcus lactis]	78	68	174
450	1	1914	988	gi1030068	NAD(P)H oxidoreductase, isoflavone reductase homologue [Solanum tuberosum]	78	63	927
558	1	762	562	gi1511588	bifunctional protein [Methanococcus jannaschii]	78	60	201
670	3	1152	1589	gi1122759	unknown [Bacillus subtilis]	78	64	438
714	1	64	732	gi143460	[37 kd minor sigma factor (rpoF, sigB; ttp start codon) [Bacillus subtilis]	78	57	669
814	1	3	368	gi1377833	unknown [Bacillus subtilis]	78	59	366
981	1	1381	692	gi143802	Gerc2 [Bacillus subtilis]	78	64	690
995	2	978	727	gi1296947	uridine kinase [Escherichia coli]	78	64	252
1045	1	3	601	gi1407784	orf-1; novel antigen [Staphylococcus aureus]	78	61	399
1163	2	368	186	gi1410117	Ulamoplimato decarboxylase [Bacillus subtilis]	78	54	181
2191	1	794	399	gi1215098	excisionase [Bacteriophage 154e]	78	65	396
2933	1	2	181	gi1120436	pyruvate formate-lyase [Haemophilus influenzae]	78	73	180
3041	2	129	317	gi1624632	GltL [Escherichia coli]	78	53	189
3581	1	105	401	gi1763186	[3-ketoacyl-CoA thiolase (Saccharomyces cerevisiae)]	78	55	297
3709	1	3	230	gi1460689	TVG [Thermactinomyces vulgaris]	78	58	228
3974	1	528	265	gi1558839	unknown [Bacillus subtilis]	76	65	264
3980	1	3	401	gi139956	ITOLC [Bacillus subtilis]	78	62	399
4056	1	647	354	gi11256635	[dihydroxy-acid dehydratase [Bacillus subtilis]	78	55	294
4114	1	630	316	gi1509372	hypothetical protein - Trypanosoma brucei	78	62	315
4185	1	3	179	gi11339950	large subunit of NADH-dependent glutamate synthase [Plactonema boryanum]	78	58	177

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
4235	1	655	329	gi 558839	unknown [Bacillus subtilis]	78	60	327
4352	1	541	302	gi 603768	HutI protein, imidazolone-5-propiolate hydrolase [Bacillus subtilis] gi 603768 HutI protein, imidazolone-5-propiolate hydrolase [Bacillus subtilis]	78	63	240
4368	1	612	307	gi 1253678	heavy-metal transporting P-type ATPase [Proteus mirabilis]	78	59	306
4461	1	428	216	gi 1276841	glutamate synthase (GOGAT) [porphyra purpurea]	78	36	213
4530	1	474	238	gi 139956	ITC1c [Bacillus subtilis]	78	65	237
3	2	2969	2073	gi 1109684	proV [Bacillus subtilis]	77	56	897
12	2	2426	1965	gi 467335	ribosomal protein L9 [Bacillus subtilis]	77	59	462
27	1	2	388	gi 1212728	YqjH [Bacillus subtilis]	77	63	387
39	2	590	1252	gi 40054	phenylalanyl-tRNA synthetase beta subunit (AA 1-804) [Bacillus subtilis]	77	60	663
42	6	2704	2931	gi 606241	30S ribosomal subunit protein S14 [Escherichia coli ap] p02370 [RS14_ECOLI 30S RIBOSOMAL PROTEIN S14 (S08 2-101)]	77	65	228
46	18	15459	16622	gi 297798	mitochondrial formate dehydrogenase precursor [Solanum tuberosum] pir JQ2272 JQ2272 formate dehydrogenase (EC 1.2.1.2) precursor, mitochondrial - potato	77	55	1164
100	4	4562	4002	gi 1340128	ORF1 [Staphylococcus aureus]	77	54	561
102	8	5378	5713	gi 1311482	acetolactate synthase [Thermus aquaticus]	77	57	336
109	7	4742	5383	gi 710637	unknown [Bacillus subtilis]	77	56	642
117	1	2	1228	gi 1237015	ORF4 [Bacillus subtilis]	77	53	1227
124	10	8323	7688	gi 405819	thymidine kinase [Bacillus subtilis]	77	63	636
147	3	1146	985	gi 849027	hypothetical 15.9-kDa protein [Bacillus subtilis]	77	37	162
152	10	7354	7953	gi 1205583	spermidine/putrescine transport ATP-binding protein [Haemophilus influenzae]	77	55	600
169	2	1004	1282	gi 473825	'elongation factor EF-Ts' [Escherichia coli]	77	58	279
184	2	380	1147	gi 216314	esterase [Bacillus stearothermophilus]	77	60	768
189	7	3296	3868	gi 853809	ORF3 [Clostridium perfringens]	77	48	573
193	1	132	290	gi 1203788	YqgH [Bacillus subtilis]	77	54	159
195	8	8740	8414	gi 1499820	M. Jannaschii predicted coding region M0798 [Methanococcus jannaschii]	77	44	327
205	8	5428	5204	gi 216340	ORF for adenylate kinase [Bacillus subtilis]	77	61	225

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
205	29	14795	14502	gi 786155	Ribosomal Protein L23 (Bacillus subtilis)	77	62	294
211	5	1908	2084	gi 410132	ORF48 (Bacillus subtilis)	77	47	177
217	5	3478	4416	gi 496254	Fibrinectin/fibrinogen-binding protein (Streptococcus pyogenes)	77	54	939
232	1	267	998	gi 1407784	orf-1: novel antigen (Staphylococcus aureus)	77	57	732
233	2	1819	1346	gi 467408	unknown (Bacillus subtilis)	77	61	474
243	3	2661	2299	gi 516155	unconventional myosin (Sus scrofa)	77	32	363
299	1	68	769	gi 467436	unknown (Bacillus subtilis)	77	54	702
301	4	1468	1283	gi 950071	ATP-bind. pyrimidine kinase [Mycoplasma capricolum] pir S48605 S48605 (fragment) hypothetical protein - Mycoplasma capricolum (S0C3) (fragment)	77	48	186
302	5	2741	3211	gi 508980	pheB (Bacillus subtilis)	77	57	471
302	7	3835	4863	gi 147783	ruvB protein (Escherichia coli)	77	60	1029
307	9	5402	4797	gi 1070015	protein-dependent (Bacillus subtilis)	77	60	606
312	1	99	1391	gi 143165	malic enzyme (EC 1.1.1.38) (Bacillus stearothermophilus) pir A3307 DEBSXS malate dehydrogenase oxaloacetate-decarboxylating (EC 1.1.1.38) - Bacillus stearothermophilus	77	62	1293
312	2	1541	2443	gi 139855	carboxyltransferase beta subunit (Synechococcus PCC7942)	77	58	903
321	5	5666	4596	gi 39844	fumarate (citG) (aa 1-462) (Bacillus subtilis)	77	65	1071
314	1	47	568	gi 1154634	YmoB (Bacillus subtilis)	77	57	522
365	1	2	1021	gi 143374	phosphoribosyl glycineamide synthetase (PUR-D; gsg start codon) Bacillus subtilis	77	62	1020
374	1	1	708	gi 1405446	transketolase (Bacillus subtilis)	77	61	708
385	1	1128	565	gi 1533099	endonuclease III (Bacillus subtilis)	77	63	564
392	2	594	1940	gi 556014	UDP-N-acetyl muramate-alanine ligase (Bacillus subtilis) sp P40778 NRC-BACSU UDP-N-ACETLMURAMATE--ALANINE LIASE (EC 3.2.8) (UDP-N-ACETLMURAMATE--ALANINE SYNTHETASE) (FRAGMENT)	77	65	1347
405	5	4079	3570	gi 1303912	Yqhw (Bacillus subtilis)	77	64	510
487	4	1302	1472	gi 432427	ORF1 gene product (Acinetobacter calcoaceticus)	77	48	171
522	1	2	562	pir A01179 SVNS	tyrosine--tRNA ligase (EC 6.1.1.1) - Bacillus stearothermophilus	77	61	561

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
523	2	1587	1351	gi 1387979	44% identity over 302 residues with hypothetical protein from <i>Smechocystis</i> sp. accession D64006_CD; expression induced by environmental stress; some similarity to glycosyl transferases; two potential membrane-spanning helices [Bacillus subtilis]	77	48	237
536	2	983	612	gi 143366	adenylosuccinate lyase (Pur-B) [Bacillus subtilis] pir C9936 MBSDS adenylosuccinate lyase (EC 4.3.2.2) - Bacillus subtilis	77	61	372
548	2	339	872	gi 143387	aspartate transcarbamylase [Bacillus subtilis]	77	56	536
597	1	2	481	gi 904198	hypothetical protein [Bacillus subtilis]	77	33	480
633	2	1747	1313	gi 1387577	ORF1A [Bacillus subtilis]	77	64	435
642	1	85	360	gi 46971	epip gene product [Staphylococcus epidermidis]	77	61	276
659	1	125	1219	gi 1072381	glutaryl-aminopeptidase [Lactococcus lactis]	77	62	1095
670	4	1587	1820	gi 1122760	unknown [Bacillus subtilis]	77	58	234
789	1	2	391	gi 1377823	aminopeptidase [Bacillus subtilis]	77	65	390
815	1	10	573	gi 1303861	Vqgm [Bacillus subtilis]	77	49	564
899	1	1	225	gi 1204844	H1. influenza predicted coding region H10594 [Influenza influenzae]	77	55	225
1003	1	3	188	gi 460828	B969 [Saccharomyces cerevisiae]	77	66	186
1942	1	415	209	gi 160047	p101/acidic basic repeat antigen [Plasmodium falciparum] pir A2932 A2932 101K malaria antigen precursor - Plasmodium falciparum [strain Camp]	77	38	207
2559	1	1	171	gi 1499034	M. jamaacchii predicted coding region M20255 [Methanococcus jamaacchii]	77	61	171
2933	2	243	401	gi 42370	pyruvate formate-lyase (AA 1-760) [Escherichia coli] ir S01788 S01788 formate C-acetyltransferase (EC 2.3.1.54) - Escherichia coli	77	72	159
2966	1	56	292	gi 1524397	glycine betaine transporter Opd [Bacillus subtilis]	77	45	237
2976	1	614	309	gi 40003	oxoglutarate dehydrogenase (NADP+) [Bacillus subtilis] p E23129 O2001 BACSU 2-OXOGLUTARATE DEHYDROGENASE E1 COMPONENT (EC 2.4.2) (ALPHA-KETOGLUTARATE DEHYDROGENASE)	77	60	306
2979	2	678	400	gi 1204354	spore germination and vegetative growth protein [Haemophilus influenzae]	77	61	279
2988	1	601	377	gi 438465	Probable operon with orf. Possible alternative initiation codon. aaaa 2151-2153. Homology with acetyltransferases.; putative Bacillus subtilis	77	55	225
2990	1	331	167	gi 142562	ATP synthase epsilon subunit [Bacillus megaterium] pir B28599 PMBSEN H1-transporting ATP synthase (EC 3.6.1.34) pslon chain - Bacillus megaterium	77	63	165
3032	1	3	389	gi 488430	alcohol dehydrogenase 2 [Entamoeba histolytica]	77	56	387
3057	1	1	195	gi 468764	moor gene product [Rhizobium meliloti]	77	50	195

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
4008	1	726	400	gi 603768	Hut1 protein, imidazole-5-propanone hydrolase [Bacillus subtilis] gi 603768 Hut1 protein, imidazole-5-propanone hydrolase [Bacillus subtilis]	77	52	327
4048	1	703	386	gi 216278	Gramicidin S synthetase 1 [Bacillus brevis]	77	55	318
4110	1	3	368	pir S2915 S329	Nitrate reductase alpha chain - Bacillus subtilis (fragment)	77	61	366
4115	1	1	348	gi 517205	167 kDa Myosin-crossreactive streptococcal antigen [Streptococcus pyogenes]	77	65	348
4225	1	590	297	gi 1322245	Nevalonate pyrophosphate decarboxylase [Rattus norvegicus]	77	60	294
4611	2	494	327	gi 508979	GTP-binding protein [Bacillus subtilis]	77	57	168
4668	1	361	182	pir S2915 S329	Nitrate reductase alpha chain - Bacillus subtilis (fragment)	77	61	180
25	3	2	1627	gi 1150620	HmxA [Streptococcus pneumoniae]	76	58	1626
36	5	1488	2537	pir A4357 A435	Regulatory protein pfor - Clostridium perfringens	76	57	1050
52	5	2962	4041	gi 1161061	Dioxygenase [Methylobacterium extorquens]	76	62	1080
56	20	27389	27955	gi 467402	Unknown [Bacillus subtilis]	76	56	567
57	15	12046	12219	gi 1206040	Weak similarity to keratin [Caenorhabditis elegans]	76	40	174
91	2	1062	2261	gi 475715	Acetyl coenzyme A acetyltransferase (thiolase) [Clostridium acetobutylicum]	76	57	1200
9A	2	818	1624	gi 467422	Unknown [Bacillus subtilis]	76	62	807
9A	5	2965	3228	gi 897793	V98 gene product [Padicoccus acidilactici]	76	52	264
9B	8	5922	6326	gi 467427	Methionyl-tRNA synthetase [Bacillus subtilis]	76	53	405
104	3	1322	1885	gi 216151	DNA polymerase (gene 1; ttg start codon) [Bacteriophage SP02] gi 579197 SP02 DNA polymerase (aa 1-648) [Bacteriophage SP02] pir A21498 DUBPS2 DNA-directed DNA polymerase [B. 2.7.7] - phage P02	76	63	564
124	9	8134	7055	gi 853776	Peptide chain release factor 1 [Bacillus subtilis] pir S55437 S55437	76	58	1080
164	5	2832	3311	gi 1204976	Prolyl-tRNA synthetase [Haemophilus influenzae]	76	53	480
168	2	2617	1841	gi 1177253	Putative ATP-binding protein of ABC-type [Bacillus subtilis]	76	58	777
189	2	163	888	gi 467384	Unknown [Bacillus subtilis]	76	63	726
235	3	2253	3518	gi 142936	Folyl-polyglutamate synthetase [Bacillus subtilis] pir B40646 B40646 folC - Bacillus subtilis	76	53	1266
236	1	335	925	gi 1146197	Putative [Bacillus subtilis]	76	54	591
237	8	5323	5541	gi 1279261	F13G3.6 [Caenorhabditis elegans]	76	47	219

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
263	5	5490	4585	gi1510348	[dihydrodipicolinate synthase [Methanococcus jannaschii]]	76	45	906
304	3	1051	1794	gi146582	[putative membrane spanning subunit [Bacillus subtilis] p1c[S52382]S52382 probable membrane spanning protein - Bacillus subtilis]	76	60	744
312	4	3613	4624	gi143312	[6-phospho-L-fructokinase [gtg start codon; EC 2.7.1.11] [Bacillus tearothermophilus]]	76	56	1014
343	1	2	1016	gi1405956	[yeeE [Escherichia coli]]	76	59	1035
347	1	409	1701	gi1396304	[acetylornithine decarboxylase [Escherichia coli]]	76	72	1293
358	1	672	1907	gi1146215	[39.0% identity to the Escherichia coli S1 ribosomal protein; putative [Bacillus subtilis]]	76	58	1236
371	1	1	222	gi1537084	[alternate gene name mgt; CG Site No. 497 [Escherichia coli] p1c[S56468]S56468 mgtA protein - Escherichia coli]	76	61	222
379	4	4331	4858	gi1143268	[dihydrodipicolinate transsuccinylase (odhB; EC 2.3.1.61) [Bacillus subtilis]]	76	61	528
404	5	4022	4492	gi1103823	[YqfG [Bacillus subtilis]]	76	60	471
411	1	2	307	gi1386025	[ORF YK037W [Saccharomyces cerevisiae]]	76	55	306
472	3	4356	2854	gi11405464	[AlaT [Bacillus subtilis]]	76	57	1503
546	1	273	995	gi1153821	[streptococcal pyrogenic exotoxin type C (spcC) precursor Streptococcus pyogenes]	76	36	723
588	1	1014	557	gi11002520	[MutS [Bacillus subtilis]]	76	61	498
591	1	16	735	gi1885934	[CtpB [Synechococcus sp.]]	76	44	720
602	2	175	798	gi11486422	[OppD homologue [Rhizobium sp.]]	76	52	624
619	2	547	290	gi1330613	[major capsid protein (Human cytomegalovirus)]	76	47	258
660	4	2568	3302	gi1904199	[hypothetical protein [Bacillus subtilis]]	76	55	735
677	1	452	228	gi140177	[spoOF gene product [Bacillus subtilis]]	76	58	225
962	1	24	206	gi1142443	[adenylosuccinate synthetase [Bacillus subtilis] sp[p39726]PURA_BACSU ADENYLOSUCCINATE SYNTHETASE (EC 6.3.4.4) IMP-ASPARTATE LIGASE]	76	67	183
978	1	1158	580	gi11511333	[M. jannaschii predicted coding region M1322 [Methanococcus jannaschii]]	76	56	579
997	1	486	244	gi1467154	[No definition line found [Mycobacterium leprae]]	76	38	243
1563	1	529	266	gi1303984	[YqkD [Bacillus subtilis]]	76	52	264
2184	1	361	182	gi1506706	[CapD [Staphylococcus aureus]]	76	38	180
2572	1	1	387	gi1518898	[transport protein [Salmonella typhimurium]]	76	65	387

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	seq gene name	% sim	% ident	length (nt)
2942	1	29	400	gi 710020	nitrite reductase (nirB) [Bacillus subtilis]	76	59	372
2957	1	377	216	gi 1511231	hypothetical protein (SP:74204) [Methanococcus jannaschii]	76	47	162
2980	1	554	279	gi 1405464	AlaT [Bacillus subtilis]	76	53	276
3015	1	649	326	gi 408115	ornithine acetyltransferase [Bacillus subtilis]	76	61	324
3124	1	13	174	gi 882705	ORF_040 [Escherichia coli]	76	65	162
3179	1	3	161	gi 168477	[ferredoxin-dependent glutamate synthase (Zea mays) pir A38596 A38596 glutamate synthase (ferredoxin) (EC 1.4.7.1) - a]ae	76	53	159
3769	1	2	379	gi 39556	YIGlc [Bacillus subtilis]	76	55	378
3892	1	3	314	gi 1510398	[ferritinophelin binding protein [Methanococcus jannaschii]	76	52	312
3928	1	798	400	gi 143016	permease [Bacillus subtilis]	76	59	399
4159	1	757	386	sp P80544 HRSP_	METHICILLIN-RESISTANT SURFACE PROTEIN (FRAGMENTS)	76	66	372
4204	1	17	331	gi 296464	ATPase [Lactococcus lactis]	76	56	315
4398	1	494	249	gi 987255	Menkes disease gene [Homo sapiens]	76	48	246
4506	1	2	313	gi 216746	D-lactate dehydrogenase [Lactobacillus plantarum]	76	47	312
4546	1	477	247	gi 1133950	[large subunit of NADH-dependent glucanase synthase [Plectonena boryanum]	76	61	231
4596	1	379	191	gi 560027	cellulose synthase [Acetobacter xylinum]	76	70	189
4	5	5257	4337	gi 882532	ORF_0294 [Escherichia coli]	75	59	921
6	1	164	952	gi 40960	OTCase [Escherichia coli]	75	56	789
12	3	5935	3944	gi 467336	unknown [Bacillus subtilis]	75	57	1992
23	18	18272	17310	gi 1296433	O-acetylserine sulphydrylase B [Alcaligenes eutrophus]	75	55	963
25	3	2356	3393	gi 1502419	[Plex [Bacillus subtilis]	75	56	1038
36	8	5765	6037	gi 1256517	unknown [Schizosaccharomyces pombe]	75	45	273
46	13	11186	12058	gi 148972	nitrate transporter [Synecoccus sp.]	75	46	873
51	7	3474	1677	gi 143607	[sporulation protein [Bacillus subtilis]	75	61	204
53	16	16850	16590	gi 143402	[recombination protein (tsg start codon) [Bacillus subtilis] gi 1303923 RecW [Bacillus subtilis]	75	51	261
74	3	3572	2568	gi 1204847	[ornithine carbamoyltransferase [Haemophilus influenzae]	75	61	1005

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
85	3	4628	3930	gi1141368	phosphoribosylformyl glycinamide synthetase I (PUR-L; gta start odon) (Bacillus subtilis)	75	63	699
85	5	5588	4878	gi1141367	phosphoribosyl-aminodazole succinocarboxamide synthetase (PUR-C; tga start codon) (Bacillus subtilis)	75	55	711
85	8	6625	7530	gi11303916	yqia (Bacillus subtilis)	75	53	906
87	3	2340	3590	gi11064813	homologous to sp:PHOR-BACSU (Bacillus subtilis)	75	56	1251
87	6	6084	6896	gi11064810	function unknown (Bacillus subtilis)	75	61	813
108	2	1844	1503	gi11001824	hypothetical protein (Synchocystis sp.)	75	51	342
110	3	1748	3727	gi11147593	putative ppGpp synthetase (Streptomyces coelicolor)	75	55	1980
110	7	4151	5252	gi11177251	ctwD gene product (Bacillus subtilis)	75	75	900
120	14	11266	10849	gi11524394	ORF-2 upstream of qbaAB operon (Bacillus subtilis)	75	55	618
121	5	2050	4221	gi11334632	Mrde (Bacillus subtilis)	75	54	2172
124	1	283	143	gi11405622	unknown (Bacillus subtilis)	75	56	141
128	1	81	1139	gi1143316	lignap gene products (Bacillus megaterium)	75	48	1059
130	8	5760	5503	gi11256654	54.8% identity with Neisseria gonorrhoeae regulatory protein P110; putative (Bacillus subtilis)	75	62	143
136	2	4480	3185	gi11467403	acetyl-CoA synthetase (Bacillus subtilis)	75	54	1296
161	10	5439	5798	gi11001195	hypothetical protein (Synchocystis sp.)	75	55	360
172	4	3819	2995	gi11755153	ATP-binding protein (Bacillus subtilis)	75	52	825
179	1	2024	1107	gi1143037	porphobilinogen deaminase (Bacillus subtilis)	75	58	918
195	10	9529	9374	sp11025745 YCFN_	HYPOTHETICAL PROTEIN IN PURB 5' REGION (ORF-15) (FRAGMENT)	75	60	156
200	4	2605	4596	gi1142440	ATP-dependent nuclease (Bacillus subtilis)	75	56	1392
206	3	6900	5620	gi11256135	ybbf (Bacillus subtilis)	75	53	1281
216	2	159	389	gi11052800	unknown (Schizosaccharomyces pombe)	75	58	231
229	1	29	847	gi11205958	branched chain aa transport system II carrier protein (Haemophilus influenzae)	75	49	819
230	2	518	1714	gi11971337	nitrite extrusion protein (Bacillus subtilis)	75	53	1197
231	3	2240	1122	gi11002521	MutL (Bacillus subtilis)	75	54	1119
233	3	1314	1859	gi11467405	unknown (Bacillus subtilis)	75	59	546

TABLE 2

5. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
269	1	325	164	gi1511246	[methyl coenzyme M reductase system, component A2 [Methanococcus jannaschii]]	75	50	162
292	1	1389	772	gi1511604	[M. jannaschii predicted coding region NJ1651 [Methanococcus jannaschii]]	75	46	618
304	4	1773	2261	gi1205328	[surfactin [Haemophilus influenzae]]	75	55	489
312	3	2437	3387	gi1285621	[undefined open reading frame [Bacillus stearothermophilus]]	75	62	951
312	5	4622	6403	gi11041097	[pyruvate kinase [Bacillus psychrophilus]]	75	57	1782
319	1	353	877	gi1212728	[yohi [Bacillus subtilis]]	75	54	525
320	5	4321	5031	gi11070361	[OMP decarboxylase [Lactococcus lactis]]	75	56	711
320	6	5010	5662	gi1143394	[OMP-PRPP transferase [Bacillus subtilis]]	75	60	633
337	4	1519	2088	gi1487433	[citrate synthase II [Bacillus subtilis]]	75	58	570
394	2	669	1271	gi1304976	[maches P50017: ATP-GTP_A and P500301: EFACITOR_GTP: similar to longation factor G. Tetra/TetO tetracycline-resistance proteins Escherichia coli]	75	51	603
423	1	127	570	gi11183839	[unknown [Pseudomonas aeruginosa]]	75	59	444
433	2	1603	1929	gi1149211	[acetolactate synthase [Klebsiella pneumoniae]]	75	63	327
446	2	176	1540	gi1112441	[dihydroorotase [Bacillus caldolyticus]]	75	62	1365
486	1	494	249	gi11149682	[potF gene product [Clostridium perfringens]]	75	55	246
496	1	3	794	gi1143582	[spoIIIEA protein [Bacillus subtilis]]	75	59	792
498	2	824	1504	gi1143328	[phoP protein (put.): putative [Bacillus subtilis]]	75	47	681
499	2	1061	1624	gi11387979	[44% identity over 302 residues with hypothetical protein from Synchocystis sp. accession D64006.CD; expression induced by environmental stress; some similarity to glycosyl transferases; two potential membrane-spanning helices [Bacillus subtilis]]	75	51	564
568	1	641	653	gi1304110341	[triacylglycerol lipase [EC 3.1.1.3] 2 - Mycoplasma mycoides subsp. mycoides [SGC3]]	75	50	189
613	2	430	233	gi1330993	[tegument protein [Salmonella herpessvirus 2]]	75	75	198
631	1	1	525	gi1529754	[speC [Streptococcus pyogenes]]	75	43	525
642	5	1809	2474	gi11176401	[EpiG [Staphylococcus epidermidis]]	75	51	666
646	2	454	657	gi1172442	[ribonuclease P [Saccharomyces cerevisiae]]	75	37	204
657	1	3	347	gi11882541	[OMP_O236 [Escherichia coli]]	75	47	345
750	1	1662	832	gi146971	[epiP gene product [Staphylococcus epidermidis]]	75	57	831

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
754	1	2	481	gi 1303901	YqhF [Bacillus subtilis]	75	57	480
763	2	563	393	gi 1205145	multidrug resistance protein [Haemophilus influenzae]	75	51	171
775	1	961	482	pir B36889 D368	leuA protein, inactive - Lactococcus lactis subsp. lactis (strain IL1403)	75	63	480
793	1	1	180	gi 143316	[gap] gene products [Bacillus megaterium]	75	57	180
800	1	318	160	gi 509411	MPRA protein [Azorhizobium caulinodans]	75	34	159
811	1	1117	560	gi 143434	Rho Factor [Bacillus subtilis]	75	60	558
940	1	493	329	gi 1276985	arginase [Bacillus caldovelox]	75	50	165
971	2	37	252	gi 1001373	hypothetical protein [Synecococcus sp.]	75	58	216
1059	1	384	232	gi 726480	L-glutamine-D-fructose-6-phosphate amidotransferase [Bacillus subtilis]	75	67	153
1109	2	219	374	gi 143331	alkaline phosphatase regulatory protein [Bacillus subtilis] pir A27630 A27650 regulatory protein Dhr - Bacillus subtilis SP P23543 PHOABCSU ALKALINE PHOSPHATASE SYNTHESIS SENSOR PROTEIN MOR (EC 2.7.3.-)	75	53	156
1268	1	271	137	gi 104135	ornithine acetyltransferase [Bacillus stearothermophilus] sp O07308 ARGJ-BACST GLUTAMATE N-ACETYLTRANSFERASE (EC 2.3.1.35) ORNITHINE ACETYLTRANSFERASE (ORNITHINE TRANSACETYLASE) (OATASE) / HINGO-ACID ACETYLTRANSFERASE (EC 2.3.1.1) (N-ACETYLGLUTAMATE YNTHA	75	63	135
1300	1	324	163	gi 1205488	excinuclease ABC subunit B [Haemophilus influenzae]	75	57	162
1329	1	798	400	gi 1002521	NutL [Bacillus subtilis]	75	54	399
3010	1	770	387	gi 1204435	pyruvate formate-lyase activating enzyme [Haemophilus influenzae]	75	54	384
3105	1	1	180	gi 1041097	Pyruvate Kinase [Bacillus psychrophilus]	75	57	180
3117	1	45	212	gi 899317	peptide synthetase module [Micrococcus aeruginosa] pir S49111 S49111 probable amino acid activating domain - Micrococcus aeruginosa (fragment) (SUB 144-528)	75	42	168
3139	2	139	345	gi 145294	adenine phosphoribosyl-transferase [Escherichia coli]	75	66	207
3880	1	618	310	gi 1009366	Respiratory nitrate reductase [Bacillus subtilis]	75	58	309
3911	1	48	401	gi 433991	ATP synthase subunit beta [Bacillus subtilis]	75	68	354
3957	1	2	379	gi 1016849 D368	3-isopropylmalate dehydratase (EC 4.2.1.33) chain I subsp. lactis (strain IL1403)	75	65	378
4005	1	5	259	gi 216746	D-lactate dehydrogenase [Lactobacillus plantarum]	75	48	255
4080	1	73	333	gi 415855	deoxyribose aldolase [Mycoplasma hominis]	75	59	261

TABLE 2

5. aureus - putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
4111	1	1	339	gi1149435	putative [Lactococcus lactis]	75	57	339
4136	1	602	703	gi1430688	hslM gene of Ecopri1 gene product [Escherichia coli] pIR[S38437]S38437 hsdM protein - Escherichia coli pIR[S09629]S09629 hypothetical protein A - Escherichia coli (SUB 40-320)	75	56	300
4144	1	668	316	gi148972	nitrate transporter [Synecococcus sp.]	75	49	333
4237	1	664	374	gi1339950	large subunit of NADH-dependent glutamate synthase [Lactonema boryanum]	75	55	291
4306	2	73	318	gi1294260	major surface glycoprotein [Pneumocystis carinii]	75	68	246
4343	1	715	359	gi1204652	methylated-DNA--protein-cysteine methyltransferase [Haemophilus influenzae]	75	52	357
4552	1	620	312	gi1298464	ATPase [Lactococcus lactis]	75	55	309
48	9	5776	6126	gi1443793	NucC [Escherichia coli]	74	50	351
50	8	6910	6221	gi1239988	hypothetical protein [Bacillus subtilis]	74	55	690
56	9	10770	12221	gi11000431	TrpA [Bacillus subtilis]	74	57	1452
64	2	2286	1622	gi141015	aspartate-CMA ligase [Escherichia coli]	74	57	645
66	6	5063	4848	gi1212729	YqhJ [Bacillus subtilis]	74	47	216
67	18	14334	14897	gi11510631	endoglucanase [Methanococcus jannaschii]	74	52	564
102	15	112561	13136	gi1149429	putative [Lactococcus lactis]	74	67	576
102	16	113121	14419	gi1149435	putative [Lactococcus lactis]	74	57	1299
108	4	4873	3902	gi139478	ATP binding protein of transport ATPases [Bacillus firmus] ir[S15486]S15486 ATP-binding protein - Bacillus firmus pJ26946[VATR_BACFI HYPOTHETICAL ATP-BINDING TRANSPORT PROTEIN]	74	59	972
116	5	8574	7093	gi11205430	dipeptide transport system permease protein [Haemophilus influenzae]	74	49	1482
120	7	4342	4803	gi1146970	ribonucleoside triphosphate reductase [Escherichia coli] pIR[A47331]A47331 anaerobic ribonucleotide reductase - Escherichia coli	74	58	462
121	7	5961	6581	gi1107528	tetG start [Campylobacter coli]	74	51	621
128	3	2320	3531	gi1143318	phosphoglycerate kinase [Bacillus megaterium]	74	57	1212
130	7	5237	5791	gi11256653	DNA-binding protein [Bacillus subtilis]	74	60	555
136	3	6745	5150	gi1143076	histidase [Bacillus subtilis]	74	58	1596
145	2	664	1368	gi1407773	devA gene product [Anabaena sp.]	74	45	705
152	1	552	277	gi11377833	unknown [Bacillus subtilis]	74	54	276

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
184	10	11064	11375	gi 580900	ORF3 gene product [Bacillus subtilis]	74	52	312
175	2	3109	2824	gi 642656	unknown [Rhizobium meliloti]	74	34	486
175	9	6064	5612	gi 854656	[Ne/H antiporter system ORF2 [Bacillus alcalophilus]	74	46	453
195	11	11346	10339	gi 1204430	hypothetical protein [SP:P25745] [Haemophilus influenzae]	74	55	1008
205	17	9619	9059	gi 1044979	ribosomal protein L6 [Bacillus subtilis]	74	64	561
236	7	5574	6710	gi 1146207	putative [Bacillus subtilis]	74	63	1137
241	3	4521	3334	gi 694121	malate thiokinase [Methylobacterium extorquens]	74	52	1188
246	6	3105	2799	gi 467374	single strand DNA binding protein [Bacillus subtilis]	74	64	507
249	4	6551	5313	gi 1524397	glycine betaine transporter OpuD [Bacillus subtilis]	74	55	1239
261	7	4389	4081	gi 809542	CbrB protein [Erwinia chrysanthemi]	74	42	309
278	6	5714	4665	gi 1204872	ATP-binding protein [Haemophilus influenzae]	74	54	1050
309	1	1220	666	gi 1205579	hypothetical protein [GB:U14003_302] [Haemophilus influenzae]	74	53	555
315	2	1473	862	gi 143398	quinol oxidase [Bacillus subtilis]	74	57	612
320	1	1	1065	gi 1343389	glutaminease of carbamyl phosphate synthetase [Bacillus subtilis] pir D39845 D39845 carbamoyl-phosphate synthase glutamine-hydrolysing (EC 6.3.5.5), pyrimidine-repressible, small chain - Bacillus subtilis	74	60	1065
340	2	382	1128	gi 534857	ATPase subunit a [Bacillus stearothermophilus]	74	56	747
405	2	1742	1311	gi 1303915	VqH2 [Bacillus subtilis]	74	65	432
433	5	2503	3270	gi 473902	alpha-acetolactate synthase [Lactococcus lactis]	74	56	768
452	1	1	942	gi 413982	lpa-58r gene product [Bacillus subtilis]	74	52	942
461	1	3	1193	gi 558494	homoserine dehydrogenase [Bacillus subtilis]	74	53	1193
461	2	1174	1407	gi 40211	threonine synthase (thrC) [AA 1-352] [Bacillus subtilis] ir A25364 A25364 threonine synthase (EC 4.2.99.2) - Bacillus btillis	74	56	234
462	2	402	734	gi 142520	thioredoxin [Bacillus subtilis]	74	62	333
478	1	574	320	gi 1499005	glycyl-tRNA synthetase [Methanococcus jannaschii]	74	52	255
501	2	739	1740	gi 217040	acid glycoprotein [Streptococcus pyogenes]	74	58	1002
551	2	4083	2791	gi 163040	glutamate-1-semialdehyde 2,1-aminotransferase [Bacillus subtilis] pir D42728 D42728 glutamate-1-semialdehyde 2,1-aminomutase (EC 4.3.8) - Bacillus subtilis	74	51	1293

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Batch gene name	% sim	% ident	length (nt)
573	1	1	477	gi11006605	hypothetical protein (Synchocystis sp.)	74	45	477
596	2	1780	1298	gi11303853	YqgF (Bacillus subtilis)	74	55	483
618	2	2924	1758	gi11146237	21.4% of identity to trans-acting transcription factor of <i>Saccharomyces cerevisiae</i> ; 25% of identity to sucrose synthase of <i>Zea mays</i> ; putative (Bacillus subtilis)	74	55	1167
659	2	1269	1595	gi11072380	ORF3 (Lactococcus lactis)	74	62	327
724	1	373	188	gi1143374	phosphoribosyl glycine synthetase (PUR-D; gtc start codon) Bacillus subtilis	74	58	186
743	2	604	1209	gi1151813	ORF1: putative (Streptococcus parasanguis)	74	50	606
816	1	2	259	gi1143458	ORF V (Bacillus subtilis)	74	47	258
989	2	443	724	gi11303994	YqgH (Bacillus subtilis)	74	46	282
1106	1	1	492	gi116970	epiD gene product (Staphylococcus epidermidis)	74	54	492
1135	2	373	528	gi11413948	ipa-24d gene product (Bacillus subtilis)	74	48	156
1234	1	817	452	gi11493245	recD gene product (Erwinia chrysanthemi)	74	36	366
2586	1	2	238	gi11149701	abcC gene product (Clostridium perfringens)	74	62	237
2959	1	798	400	gi11405454	aconitase (Bacillus subtilis)	74	60	399
2962	1	650	363	gi11450686	3-phosphoglycerate kinase (Thermotoga maritima)	74	58	288
2983	1	3	191	gi11301893	YqgH (Bacillus subtilis)	74	56	189
3018	1	2	223	gi1143040	glutamate-1-semialdehyde 2,1-aminotransferase (Bacillus subtilis) plr[04728][04728 glutamate-1-semialdehyde 2,1-aminotransferase (EC 4.3.8) - Bacillus subtilis	74	56	222
3038	1	510	256	pir1552915 5529	nitrate reductase alpha chain - Bacillus subtilis (fragment)	74	57	255
3062	1	374	189	gi11107528	ttg start (Campylobacter coli)	74	51	186
4035	1	184	360	gi11022725	unknown (Staphylococcus haemolyticus)	74	64	177
4045	1	607	305	gi11510977	M. Jannaschii predicted coding region M0938 (Methanococcus jannaschii)	74	41	303
4283	1	471	304	gi11520844	orf4 (Bacillus subtilis)	74	58	188
4449	1	3	221	gi11580910	peptide-synthetase ORF1 (Bacillus subtilis)	74	54	219
4587	1	458	231	gi11170207	orf6 (Lactobacillus sake)	74	59	228

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% Ident	length (nt)
4603	1	29	214	gi146208	glutamate synthase large subunit (EC 2.6.1.53) [Escherichia coli] pir[A29617]A29617 glutamate synthase (NADPH) (EC 1.4.1.13) large chain - Escherichia coli	74	60	186
4670	1	366	184	gi1256135	ybbP [Bacillus subtilis]	74	61	183
5	10	7953	7162	gi1343727	putative [Bacillus subtilis]	73	42	792
11	2	2454	1372	gi1166338	[dihydroorotate dehydrogenase [Agrobacterium tumefaciens]]	73	55	1083
14	1	2024	1020	gi1143373	[phosphoribosyl aminimidazole carboxy formyl oranylttransferase/inosine monophosphate cyclohydrolyase (Pur-H)] [Bacillus subtilis]	73	54	1005
23	5	5426	4635	gi11468939	meso-2,3-butanediol dehydrogenase (D-acetoin forming) [Klebsiella pneumoniae]	73	58	792
23	17	17379	16360	gi1297060	ornithine cyclodeminase [Rhizobium meliloti]	73	37	1020
29	2	692	1273	gi1467442	stage V sporulation [Bacillus subtilis]	73	54	582
31	5	6467	4914	gi1414000	[ipa-76d gene product [Bacillus subtilis]]	73	55	1554
37	8	8658	7402	gi1429259	[pepT gene product [Bacillus subtilis]]	73	59	1257
37	9	7738	7562	gi1168367	[alpha-isopropylmalate isomerase (put.) putative [Rhizomucor ircinellolides]]	73	52	177
38	7	3931	4896	gi1405885	[yefN [Escherichia coli]]	73	58	966
44	6	5041	4238	gi1380895	[unknown [Bacillus subtilis]]	73	53	804
44	11	7767	8306	gi142009	[mnaB gene product [Escherichia coli]]	73	50	540
45	3	2439	3080	gi1109685	[ProW [Bacillus subtilis]]	73	47	642
54	13	14016	13794	gi1413931	[ipa-7d gene product [Bacillus subtilis]]	73	61	243
59	4	1430	2248	gi1147923	[threonine dehydratase 2 (EC 4.2.1.16) [Escherichia coli]]	73	53	819
65	1	1458	730	gi1167944	[AppF [Bacillus subtilis]]	73	56	729
80	2	1375	860	gi1580932	[murD gene product [Bacillus subtilis]]	73	53	516
102	13	10124	11179	gi1580891	[3-isopropylmalate dehydrogenase (AA 1 - 365) [Bacillus subtilis]] pir[A26522]A26522 3-isopropylmalate dehydrogenase (EC 1.1.1.45) - acillus subtilis	73	55	1056
109	2	3493	2600	gi11510849	[M. jannaschii predicted coding region MJ0775 [Methanococcus jannaschii]]	73	40	894
120	8	4782	5756	gi1146970	[ribonucleoside triphosphate reductase [Escherichia coli] pir[A47331]A47331 anaerobic ribonucleotide reductase - Escherichia coli]	73	56	975
120	9	5726	6223	gi11204333	[anaerobic ribonucleoside-triphosphate reductase [Haemophilus influenzae]]	73	62	498

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
132	5	4151	4363	gi 1871048	[HPSK2 - heavy chain potential motor protein (Giardia intestinalis)]	73	43	213
140	6	5952	6324	gi 1634107	[kdoB (Escherichia coli)]	73	59	1629
142	6	7060	5939	gi 1410125	[rliU gene product (Bacillus subtilis)]	73	57	1122
149	4	1866	1717	gi 1460892	[heparin binding protein-44, HBP-44 (mice, Peptide, 360 aa)] [pirJX0281] [JX0281] heparin-binding protein-44 precursor - mouse gi 220434 [ORF (Mus musculus) (SUB 2-360)]	73	53	150
158	1	1	1431	gi 1882504	[ORF_1560 (Escherichia coli)]	73	57	1431
174	6	5352	4525	gi 1146240	[ketopantoate hydroxymethyltransferase (Bacillus subtilis)]	73	55	828
175	8	5537	5178	gi 1854657	[Na/H antiporter system ORF3 (Bacillus alcalophilus)]	73	56	360
186	5	6593	5493	gi 1467477	[unknown (Bacillus subtilis)]	73	48	1101
249	6	6283	5729	gi 11524397	[glycine betaine transporter OpuB (Bacillus subtilis)]	73	56	555
265	4	1873	2280	gi 139848	[iU3 (Bacillus subtilis)]	73	41	408
270	1	328	582	gi 790461	[220 kDa polypeptide (African swine fever virus)]	73	53	255
270	4	4283	3618	gi 1208965	[hypothetical 23.3 kD protein (Escherichia coli)]	73	49	666
279	3	4984	3593	gi 1185288	[isochorismate synthase (Bacillus subtilis)]	73	58	1392
291	4	1207	1575	gi 1511440	[glutamine--fructose-6-phosphate transaminase (Methanococcus jannaschii)]	73	63	369
299	2	735	1166	gi 1467437	[unknown (Bacillus subtilis)]	73	58	432
299	5	2050	3234	gi 1467439	[Temperature sensitive cell division (Bacillus subtilis)]	73	53	1185
334	1	1237	728	gi 1536655	[ORF YBR244w (Saccharomyces cerevisiae)]	73	43	510
336	2	1827	1036	gi 790943	[urea amidolyase (Bacillus subtilis)]	73	51	792
374	3	1389	1874	gi 1405451	[YneJ (Bacillus subtilis)]	73	55	486
433	4	1916	2554	gi 1473902	[alpha-acetolactate synthase (Lactococcus lactis)]	73	54	639
509	2	1795	1028	gi 1467483	[unknown (Bacillus subtilis)]	73	56	768
513	1	1709	918	gi 1146220	[NAD+ dependent glycerol-3-phosphate dehydrogenase (Bacillus subtilis)]	73	56	792
533	2	239	733	gi 1510605	[hypothetical protein (SP:P42297) (Methanococcus jannaschii)]	73	44	495
546	2	1148	2815	gi 141748	[hdm protein (AA 1-520) (Escherichia coli)]	73	52	1668
549	1	762	382	gi 1314847	[ClnA (Bacillus subtilis)]	73	57	381
567	1	1346	675	gi 1410137	[ORFX13 (Bacillus subtilis)]	73	58	672

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
716	2	654	1112	gi11258623	exodeoxyribonuclease (Bacillus subtilis)	73	56	459
772	1	3	677	gi1142010	Shows 70.2% similarity and 48.6% identity to the EnvM protein of almonella typhimurium (Aerobius sp.)	73	57	675
774	1	3	209	gi1409286	barU (Bacillus subtilis)	73	52	207
782	1	1	402	gi1143320	[gap] gene products (Bacillus megaterium)	73	56	402
789	2	451	762	gi11063246	low homology to p14 protein of Hemophilus influenzae and 14.2 kDa protein of Escherichia coli (Bacillus subtilis)	73	56	312
796	1	3	911	gi1453754	ABC transporter (Bacillus subtilis)	73	58	909
806	3	1209	949	gi1143786	tryptophanyl-tRNA synthetase (EC 6.1.1.2) (Bacillus subtilis)	73	51	261
816	2	4839	3097	gi141748	hsmH protein (AA 1-520) (Escherichia coli)	73	52	1743
839	1	798	400	gi1886906	argininosuccinate synthetase (Streptomyces clavuligerus) p1r[S57659]/S57659	73	59	399
857	1	3	290	gi1346052	argininosuccinate synthetase (EC 6.3.4.5) - treptonococcus clavuligerus	73	50	288
1008	1	790	398	gi140100	acetoin utilization protein (Bacillus subtilis)	73	50	288
					rodC (tag) polypeptide (AA 1-746) (Bacillus subtilis) r[S06049]/S06049	73	41	393
					rodC protein - Bacillus subtilis p131485/TAGF-BACSD TECHNIC ACID BIOSYNTHESIS PROTEIN F.			
1018	1	1	213	gi1529357	No definition line found (Caenorhabditis elegans) sp[P46975]/STT3_CAZEL	73	53	213
					OLIGOSACCHARYL TRANSFERASE STT3 SUBUNIT OHLOG.			
1011	1	3	491	gi1142706	comC gene product (Bacillus subtilis)	73	51	489
1174	1	395	204	gi1149513	alpha2 subunit of laminin 5 (Homo sapiens)	73	60	192
1175	1	655	329	gi1173817	"ORF" (Escherichia coli)	73	57	327
1187	1	3	209	gi1580870	ipa-37d qoxA gene product (Bacillus subtilis)	73	52	207
1206	1	72	245	gi144816	formyltetrahydrofolate synthetase (FTHS) (tsg start codon) (EC 3.4.3) (Moorella thermocetica)	73	43	174
1454	1	423	241	gi11213253	unknown (Schizosaccharomyces pombe)	73	53	183
1469	1	517	260	gi11303787	YqeG (Bacillus subtilis)	73	55	258
1761	1	374	189	gi19135	Hat26Aa gene product (Drosophila simulans)	73	34	186
1849	1	467	243	gi1162307	DNA topoisomerase II (Trypanosoma cruzi)	73	60	225
2055	1	2	400	gi159381	P47K protein (Rhodococcus erythropolis)	73	34	399
2556	1	2	244	gi1145925	fecB (Escherichia coli)	73	62	243

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
2947	2	549	400	gi 1184680	polynucleotide phosphorylase [Bacillus subtilis]	73	51	150
2956	1	746	375	gi 143397	quinol oxidase [Bacillus subtilis]	73	58	372
3037	1	655	329	gi 143091	lactolactate synthase [Bacillus subtilis]	73	55	329
3115	1	385	194	gi 323866	overlapping out-of-phase protein [eggplant mosaic virus]	73	53	192
				sp P20129 V70K_EPHV 70 KD PROTEIN				
3603	2	700	527	gi 1449521	glutaryl-CoA dehydrogenase precursor [Mus musculus]	73	48	174
3743	1	798	400	gi 450688	hsc70 gene of Escherichia coli product [Escherichia coli] pir S38437 S38437 hsc70 protein - Escherichia coli pir S09629 S09629 hypothetical protein A - Escherichia coli (SUB 40-520)	73	54	399
3752	1	640	359	gi 1524193	unknown [Mycobacterium tuberculosis]	73	59	282
3852	1	2	181	gi 216746	D-lactate dehydrogenase [Lactobacillus plantarum]	73	68	180
3914	1	475	239	pir S13490 S134	hydroxymethylglutaryl-CoA synthase (EC 4.1.3.5) - Chicken (fragment)	73	53	237
3914	2	570	343	gi 528991	unknown [Bacillus subtilis]	73	38	228
4069	1	2	316	gi 40003	oxoglutarate dehydrogenase (NADP+) [Bacillus subtilis] p P23125 ODD1_BACSU 2-OXOGLUTARATE DEHYDROGENASE E1 COMPONENT (EC 2.4.2) (ALPHA-KETOGLUTARATE DEHYDROGENASE)	73	55	315
4165	1	715	365	gi 1639521	glutaryl-CoA dehydrogenase precursor [Mus musculus]	73	48	351
4196	1	1	177	gi 409660	deoxyribose-phosphate aldolase [Bacillus subtilis] pir S49455 S49455 deoxyribose-phosphate aldolase (EC 4.1.2.4) - Bacillus subtilis	73	60	177
4202	1	572	378	gi 528991	unknown [Bacillus subtilis]	73	38	192
4314	1	2	193	gi 436797	N-acyl-L-amino acid amidohydrolase [Bacillus stearothermophilus]	73	47	192
				sp P37112 AMA_BACST N-ACYL-L-AMINO ACID AMIDOHYDROLASE (EC 5.1.1.14) (AMINOACYLASE)				
4393	1	3	263	gi 216267	ORF2 [Bacillus megaterium]	73	47	261
35	2	903	1973	gi 1116196	phosphoglycerate dehydrogenase [Bacillus subtilis]	72	53	1071
38	22	19094	17877	gi 602031	similar to trimethylamine OH [Mycoplama capricolum] pir S49950 S49950 probable trimethylamine dehydrogenase (EC 5.99.7) - Mycoplasma capricolum (S6C3) (fragment)	72	54	1218
38	23	18134	19162	gi 413968	ipa-440 gene product [Bacillus subtilis]	72	54	1039
44	19	11895	12953	gi 516272	unknown [Bacillus subtilis]	72	49	1059
48	7	6248	7117	gi 414699	pyruvate synthase [Halobacterium halobium]	72	49	870
50	7	6563	5691	gi 1205399	proton glutamate symport protein [Haemophilus influenzae]	72	53	873

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
53	9	10521	9259	gi 1303956	YojE [Bacillus subtilis]	72	52	1263
56	23	29549	29995	gi 1467471	unknown [Bacillus subtilis]	72	47	447
69	4	5298	4123	gi 1354775	pfoS/R [Treponema pallidum]	72	46	1126
69	5	4377	4982	gi 904198	hypothetical protein [Bacillus subtilis]	72	43	606
73	1	2	856	gi 142997	glycerol uptake facilitator [Bacillus subtilis]	72	59	855
98	13	9371	10258	gi 1467435	unknown [Bacillus subtilis]	72	50	888
127	1	1	1593	gi 217144	alanine carrier protein [thermophilic bacterium PS3] pir[A45111][A45111]	72	56	1593
131	1	5197	2600	gi 153952	alanine transport protein - thermophilic acterium PS-3	72	53	2598
141	4	1040	1978	gi 1405446	polymerase III polymerase subunit (dnaE) [Salmonella typhimurium]	72	54	939
149	8	2819	2535	gi 1606234	pir[A45915][A45915 DNA-directed DNA polymerase (EC 2.7.7.7)] III lpha chain - Salmonella typhimurium	72	44	285
149	17	5472	5245	gi 1304472	transketolase [Bacillus subtilis]	72	55	228
154	1	1	210	gi 1205620	isecy [Escherichia coli]	72	40	210
155	1	2207	1320	gi 1391610	DNA polymerase [unidentified phycodnavirus clone OT04]	72	57	888
180	1	2	328	gi 131630	ferritin like protein [Haemophilus influenzae]	72	62	327
184	3	1145	3553	gi 1205110	[farnesyl diphosphate synthase [Bacillus stearothermophilus] pir[JX0257][JX0257 geranyltranstransferase (EC 2.5.1.10)] - Bacillus stearothermophilus]	72	49	2409
195	2	1923	1279	gi 1001730	virulence associated protein homolog [Haemophilus influenzae]	72	45	645
206	13	14646	15869	gi 1064807	hypothetical protein [Synchocystis sp.]	72	50	1224
209	2	462	932	gi 1204466	ORTHINE ANTIORANSPERASE [Bacillus subtilis]	72	60	471
215	2	764	522	gi 1481513	hypothetical protein [GB:X71124.53] [Haemophilus influenzae]	72	63	243
224	1	2	790	gi 1495974	insulin receptor homolog [Drosophila melanogaster] pir[S57245][S57245 insulin receptor homolog - fruit fly (Drosophila melanogaster) (SUB 46-2146)]	72	54	789
233	1	1526	765	gi 1408493	sucrose repressor [Staphylococcus xylosus]	72	52	762
240	1	220	1485	gi 1337049	homologous to SwissProt:YIDA_ECOI hypothetical protein [Bacillus subtilis]	72	52	1266
245	1	3	1340	gi 1204578	ORF_0470 [Escherichia coli]	72	46	1338
					hypothetical protein [GB:U06949.1] [Haemophilus influenzae]	72		

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
255	2	2108	1245	gi 1340128	ORF1 [Staphylococcus aureus]	72	59	864
304	3	285	1094	gi 1205330	glutamine-binding periplasmic protein [Haemophilus influenzae]	72	52	810
307	10	5326	5039	gi 1070015	protein-dependent [Bacillus subtilis]	72	53	288
315	1	517	260	gi 143399	quinol oxidase [Bacillus subtilis]	72	55	258
316	11	9622	9308	gi 1204445	hypothetical protein (SP127857) [Haemophilus influenzae]	72	56	315
337	3	926	1609	gi 487433	citrate synthase II [Bacillus subtilis]	72	55	684
364	7	12538	10493	gi 1510643	ferrous iron transport protein B [Methanococcus jannaschii]	72	53	2046
409	2	340	1263	gi 1402944	orfH1 gene product [Bacillus subtilis]	72	49	924
441	3	2177	1590	gi 112379	highly conserved among subacteria [Clostridium acetobutylicum]	72	48	588
453	6	2654	2505	gi 500601	antibacterial protein 3 - Staphylococcus haemolyticus	72	70	150
460	1	2	625	gi 1016162	ABC transporter subunit [Cyanophora paradoxa]	72	51	624
463	1	3253	1628	gi 666014	The polymorphism (RUP) of this gene is associated with susceptibility to essential hypertension. The SA gene product has light homology to acetyl-CoA synthetase [Homo sapiens]	72	60	1626
480	4	3047	3466	gi 433992	ATP synthase subunit epsilon [Bacillus subtilis]	72	53	420
502	1	1086	586	gi 310859	ORF2 [Synecococcus sp.]	72	50	501
519	1	81	1184	gi 1103704	YrKE [Bacillus subtilis]	72	54	1104
559	1	3	746	gi 1107530	leuD gene product [Campylobacter coli]	72	56	744
575	1	1142	573	gi 1303866	YqgS [Bacillus subtilis]	72	56	570
671	1	2	592	gi 1204497	protein-export membrane protein [Haemophilus influenzae]	72	44	591
679	2	295	1251	gi 563258	virulence-associated protein E [Pichobacter nodosus]	72	52	957
687	2	295	957	gi 1146214	44% identical amino acids with the Escherichia coli ambA suppressor; putative [Bacillus subtilis]	72	49	663
837	1	1	435	gi 1146183	putative [Bacillus subtilis]	72	54	435
868	1	150	788	gi 1377842	unknown [Bacillus subtilis]	72	55	639
922	1	130	432	gi 1088269	unknown protein [Aerobacter vinelandii]	72	58	301
941	1	2	238	gi 153929	NADPH-sulfite reductase [Salmonella typhimurium]	72	49	237
980	1	840	421	gi 853767	UDP-N-acetylglucosamine 1-carboxyvinyltransferase [Bacillus subtilis]	72	59	420

TABLE 2

5. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
1209	1	383	213	gi 144735	neurotoxin type B [Clostridium botulinum]	72	44	171
1469	2	671	474	gi 1203458	hypothetical protein [CB-D2652.47] [Haemophilus influenzae]	72	63	198
1956	1	727	365	gi 154409	hexosephosphate transport protein [Salmonella typhimurium] pI: [B4185] [B4185] hexose phosphate transport system regulatory protein uhpB - Salmonella typhimurium	72	44	363
2101	1	3	401	gi 1303950	VqV [Bacillus subtilis]	72	50	399
2501	1	369	399	gi 149713	formate dehydrogenase [Methanobacterium formicicum] pI: [A42712] [A42712] formate dehydrogenase [EC 1.2.1.2] - Methanobacterium formicicum	72	56	171
2967	1	3	155	gi 1212729	VqB3 [Bacillus subtilis]	72	46	153
3004	1	367	185	gi 166599	hypothetical protein [Bacillus subtilis]	72	55	183
3109	1	278	141	gi 1413968	lpa-44d gene product [Bacillus subtilis]	72	45	138
3171	1	3	287	gi 1515938	glutamate synthase (ferredoxin) [Synchocystis sp.] pI: [S46957] [S46957] glutamate synthase (ferredoxin) [EC 1.4.7.1] - Synchocystis sp.	72	52	285
3771	1	26	367	gi 1408501	homologous to N-acyl-L-amino acid amidohydrolase of Bacillus stearothermophilus [Bacillus subtilis]	72	63	342
3951	1	1	222	gi 1500409	M. jannaschii predicted coding region M1519 [Methanococcus jannaschii]	72	38	222
4190	1	721	362	gi 39956	l101C [Bacillus subtilis]	72	57	360
4444	1	3	347	gi 1009366	respiratory nitrate reductase [Bacillus subtilis]	72	55	345
6	2	911	1200	gi 1537095	ornithine carbamoyltransferase [Escherichia coli]	71	55	270
11	15	11350	10859	gi 1533309	35 kDa protein [Escherichia coli]	71	47	492
19	2	1248	2435	gi 1244574	D-alanine-D-alanine ligase [Enterococcus hirae]	71	52	1188
21	2	898	1488	gi 149629	anthranilate synthase component 2 [Leptospira biflexa] pI: [C32840] [C32840] anthranilate synthase [EC 4.1.3.27] component II Leptospira biflexa	71	45	591
34	1	1	567	gi 1303983	VqK [Bacillus subtilis]	71	59	567
37	3	3192	2806	gi 1209681	glutamate-rich protein [Bacillus firmus]	71	50	387
38	18	12250	12462	gi 1927645	arginyl endopeptidase [Porphyromonas gingivalis]	71	50	213
39	3	1246	4431	gi 1509411 S094	spol11E protein - Bacillus subtilis	71	49	3186
53	14	15770	14760	gi 142611	branched chain alpha-keto acid dehydrogenase E1-alpha [Bacillus subtilis]	71	56	1011
54	11	13461	12625	gi 143014	lont repressor [Bacillus subtilis]	71	46	837

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
57	7	7152	5860	gi 508175	EIIIC domain of PPS-dependent Gat transport and phosphorylation Escherichia coli	71	48	1293
57	18	11897	14334	gi 1063247	high homology to flavohemoprotein (hemoglobin-like protein) of Alcaligenes eutrophus and Saccharomyces cerevisiae [Bacillus subtilis]	71	56	438
62	16	9831	10955	gi 1301926	Vq10 [Bacillus subtilis]	71	54	1125
70	12	8505	8966	gi 147198	phnE protein [Escherichia coli]	71	38	462
86	5	2194	2089	gi 1904205	hypothetical protein [Bacillus subtilis]	71	51	306
96	7	7601	8269	gi 709991	hypothetical protein [Bacillus subtilis]	71	49	669
100	6	4822	5931	gi 1060848	opine dehydrogenase [Arthrobacter sp.]	71	45	1110
103	1	1062	522	gi 143089	lep protein [Bacillus subtilis]	71	41	531
109	18	15312	15695	gi 413985	(lpa-6)id gene product [Bacillus subtilis]	71	57	384
113	1	630	316	gi 663254	probable protein kinase [Saccharomyces cerevisiae]	71	57	315
114	5	6598	5603	gi 143156	membrane bound protein [Bacillus subtilis]	71	40	996
133	2	3087	1723	gi 1303913	Vqbx [Bacillus subtilis]	71	53	1365
149	19	6335	5895	gi 529650	GOP [Bacteriophage SPPI]	71	51	461
154	5	3635	3087	gi 425488	repressor protein [Streptococcus sobrinus]	71	47	549
164	11	11354	11689	gi 49318	ORF4 gene product [Bacillus subtilis]	71	52	116
169	5	1936	2745	gi 1403403	unknown [Mycobacterium tuberculosis]	71	56	810
193	2	272	1334	gi 1303788	Vqeh [Bacillus subtilis]	71	49	963
205	1	1743	895	gi 1215694	GlnQ [Mycoplasm pneumoniae]	71	46	849
233	4	1849	2022	gi 633732	ORF1 [Campylobacter jejuni]	71	50	174
237	7	4501	5169	gi 149384	HistE [Lactococcus lactis]	71	54	669
272	4	2848	2273	gi 709993	hypothetical protein [Bacillus subtilis]	71	48	576
274	2	618	1496	gi 143035	NAD(P)H:glutamate-transfer RNA reductase [Bacillus subtilis] pir A35252 A35252 5-aminolevulinate synthase (EC 2.3.1.37) - acillus subtilis	71	53	879
276	5	3149	2720	gi 1303562	IOBP210 [Escherichia coli]	71	50	630
287	1	1176	660	gi 1310634	20 kDa protein [Streptococcus gordonii]	71	53	525
288	6	3322	2771	gi 1256625	putative [Bacillus subtilis]	71	47	552

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
301	6	3492	2461	gi 467417	similar to lysine decarboxylase [Bacillus subtilis]	71	57	1032
306	4	6607	5222	gi 3256618	transport protein [Bacillus subtilis]	71	56	1386
307	2	1536	925	gi 632683	orfC [Mycobacterium capricolus]	71	45	612
310	5	5793	5146	gi 348052	acetoin utilization protein [Bacillus subtilis]	71	51	648
322	1	2	1303	gi 1001819	hypothetical protein [Synecococcus sp.]	71	46	1302
333	4	4171	3995	gi 467473	unknown [Bacillus subtilis]	71	57	177
350	2	548	922	gi 551879	ORF 1 [Lactococcus lactis]	71	55	375
375	4	1860	3071	gi 467447	unknown [Bacillus subtilis]	71	57	1212
380	5	1560	2102	gi 142557	ATP synthase b subunit [Bacillus megaterium]	71	43	543
414	2	251	637	gi 580904	homologous to E. coli rnpA [Bacillus subtilis]	71	49	387
424	1	335	1334	gi 581305	U-lactate dehydrogenase [Lactobacillus plantarum]	71	57	1020
436	4	3701	3270	gi 390501 P005	phosphoribosylanthranilate isomerase (EC 5.3.1.24) - Bacillus subtilis (fragment)	71	66	432
482	1	3	1280	gi 410142	ORF18 [Bacillus subtilis]	71	49	1278
525	3	2272	1844	gi 143370	phosphoribosylpyrophosphate amidotransferase (Pur-F; EC 2.4.2.14) Bacillus subtilis	71	56	429
529	4	2739	2047	gi 606150	ORF_309 [Escherichia coli]	71	43	691
563	1	22	969	gi 1237015	ORF4 [Bacillus subtilis]	71	53	948
581	1	506	255	gi 1301730	T25G3.2 [Caenorhabditis elegans]	71	47	252
612	2	1068	913	gi 153968	flabrase 2 [Salmonella typhimurium]	71	55	156
613	1	1	654	gi 466778	lysine specific permease [Escherichia coli]	71	50	654
618	1	1243	623	gi 1146238	[poly(A) polymerase [Bacillus subtilis]	71	52	621
630	1	1170	586	gi 11486243	unknown [Bacillus subtilis]	71	53	585
691	1	1126	841	gi 189260	cond ORF1 [Bacillus subtilis]	71	51	486
694	2	149	427	gi 127971	NADH dehydrogenase subunit V (AA 1-605) [Gallus gallus] ir[S10197/S10197 NADH dehydrogenase (ubiquinone) (EC 1.6.5.3) chain - chicken mitochondrion (S0C3)]	71	47	279
715	2	169	777	gi 130830	YqfL [Bacillus subtilis]	71	53	609
746	2	1473	970	gi 1377843	unknown [Bacillus subtilis]	71	52	504

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins.

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
748	1	1437	802	gi11403459	Ynes [Bacillus subtilis]	71	49	636
753	1	1018	524	gi11510389	M. jannaschii predicted coding region MJ0296 [Methanococcus jannaschii]	71	53	495
761	1	3	215	gi1475972	pentafunctional enzyme [Pneumocystis carinii]	71	47	213
783	1	1203	703	gi1536655	ORF YBR244w [Saccharomyces cerevisiae]	71	52	501
800	3	1292	987	gi11204326	tRNA delta(2)-isopentenylpyrophosphate transferase [Haemophilus influenzae]	71	48	306
806	1	1116	286	gi11419075	cbiM gene product [Methanobacterium thermoautotrophicum]	71	50	171
931	1	973	488	gi1893358	PgsA [Bacillus subtilis]	71	56	486
1041	1	2	262	gi11408507	pyrimidine nucleoside transport protein [Bacillus subtilis]	71	45	261
1070	1	2	172	gi1709993	hypothetical protein [Bacillus subtilis]	71	46	171
1176	1	57	365	gi1151259	HMG-CoA reductase (EC 1.1.1.88) [Pseudomonas mevalonii] pir144756[M4756 hydroxymethylglutaryl-CoA reductase (EC 1.1.1.88) Pseudomonas sp.]	71	49	309
1181	1	366	184	gi146971	epiP gene product [Staphylococcus epidermidis]	71	50	183
1281	1	3	390	gi1151016	ORF 419 protein/[Staphylococcus aureus]	71	50	288
1348	1	456	229	gi1602683	orfC [Mycoplasma capricolum]	71	48	228
2002	1	756	379	gi11008177	ORF YJL046w [Saccharomyces cerevisiae]	71	48	378
2119	1	2	217	gi11046088	arginyl-tRNA synthetase [Mycoplasma genitalium]	71	50	216
2418	1	3	320	gi11499771	M. jannaschii predicted coding region MJ0936 [Methanococcus jannaschii]	71	57	318
2961	1	2	187	gi1312443	carbamoyl-phosphate synthase [glutamine-hydrolyzing] [Bacillus aldylyticus]	71	57	186
2989	2	67	306	gi1710020	nitrite reductase (nirB) [Bacillus subtilis]	71	43	240
3033	1	2	184	gi11262335	YmaA [Bacillus subtilis]	71	57	183
3584	1	3	338	gi1401716	beta-isopropylmalate dehydrogenase [Neurospora crassa]	71	55	336
3715	2	743	399	gi1563952	glucanate permease [Bacillus licheniformis]	71	59	345
3785	1	770	387	gi147382	acyl-CoA-dehydrogenase [Streptomyces purpurascens]	71	57	384
3875	1	541	272	gi11001541	hypothetical protein [Synchocystis sp.]	71	38	270
4135	1	637	320	gi1142695	S-adenosyl-L-methionine:uroporphyrinogen III methyltransferase Bacillus megaterium	71	52	318
4249	1	63	219	gi11205363	deoxyribose aldolase [Haemophilus influenzae]	71	63	177
4508	1	530	267	gi11197667	vitellogenin [Anolis pulchellus]	71	46	264

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
6	3	1237	2721	gi 1321788	arginine ornithine antiporter [Clostridium perfringens]	70	54	1485
11	11	6572	7486	gi 216854	P47K [Pseudomonas chlororaphis]	70	41	915
12	1	2890	1481	gi 467330	replicative DNA helicase [Bacillus subtilis]	70	49	1410
15	1	1756	893	gi 451216	Mannosephosphate isomerase [Streptococcus mutans]	70	46	864
15	2	1277	1050	gi 476092	unknown [Bacillus subtilis]	70	50	228
17	2	2132	1350	gi 145402	choline dehydrogenase [Escherichia coli]	70	52	783
21	1	2	925	gi 149516	anthranilate synthase alpha subunit [Lactococcus lactis] pIR[S35124] anthranilate synthase (EC 4.1.3.27) alpha chain - actococcus lactis subsp. lactis	70	50	924
25	7	5580	6251	gi 1389549	ORF3 [Bacillus subtilis]	70	52	672
31	6	6071	7423	gi 1103875	YqjB [Bacillus subtilis]	70	51	1353
36	2	959	1594	gi 500755	methy purine glycosylase [Mus musculus]	70	47	636
38	8	4901	5860	gi 1408507	pyrimidine nucleoside transport protein [Bacillus subtilis]	70	44	960
44	8	5312	5989	gi 1006620	hypothetical protein [Synchocystis sp.]	70	49	678
46	10	8950	10020	gi 1403126	lcscD gene product [Alcaligenes eutrophus]	70	45	1071
52	2	2727	1900	gi 1486247	unknown [Bacillus subtilis]	70	53	828
52	6	4048	4656	gi 244501	esterase II:carboxylesterase (EC 3.1.1.1) [Pseudomonas fluorescens, optido, 218 aa]	70	50	609
56	8	8460	9962	gi 1319951	small subunit of NADH-dependent glutamate synthase [Plectonoma boryanum]	70	51	1503
62	1	48	290	gi 142702	A competence protein 2 [Bacillus subtilis]	70	47	243
64	1	1080	541	gi 1204377	polydopterin biosynthesis protein [Haemophilus influenzae]	70	47	540
70	5	5139	3595	gi 1204834	2'-cyclic-nucleotide 2'-phosphodiesterase [Haemophilus influenzae]	70	47	1545
91	4	7793	3466	gi 886471	methionine synthase [Catharanthus roseus]	70	56	2328
96	5	8754	7255	pir B39096 B390	alkaline phosphatase (EC 3.1.3.1) III precursor - Bacillus subtilis	70	54	1500
110	2	767	1300	gi 145294	adenine phosphoribosyl-transferase [Escherichia coli]	70	50	931
116	6	7026	7976	gi 141607	sporulation protein [Bacillus subtilis]	70	45	588
121	8	6401	6988	gi 1107528	ltg start [Campylobacter coli]	70	48	1095
131	8	6842	7936	gi 1150454	proliferase PcpO [Lactobacillus delbrueckii]	70	48	1095

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
135	1	2	1489	gi 311309	putative membrane-bound protein with four times repetition of ro-Ser-Ala at the N-terminus; function unknown (Alcaligenes utrophus)	70	49	1488
138	3	438	714	gi 504181	hypothetical protein (Bacillus subtilis)	70	46	297
164	8	9344	9874	gi 49315	ORF1 gene product (Bacillus subtilis)	70	47	531
164	16	15626	16618	gi 1205212	hypothetical protein (G8-D1048)_18 (Haemophilus influenzae)	70	50	993
205	2	2735	1803	gi 1215695	peptide transport system protein SapF homolog; SapF homolog (Mycoplasma pneumoniae)	70	47	933
209	3	910	1386	gi 1204665	hypothetical protein (G8-X7124_26) (Haemophilus influenzae)	70	48	477
246	3	340	756	gi 215098	excisionase (Bacteriophage 154a)	70	46	417
261	7	7876	6749	gi 142540	aspartokinase II (Bacillus sp.)	70	51	1128
286	3	3212	4117	gi 1340128	ORF1 (Staphylococcus aureus)	70	50	906
302	6	3201	3827	gi 147782	ruva protein (gag start) (Escherichia coli)	70	46	627
302	10	5879	7051	gi 138530 C185	queuine tRNA-ribosyltransferase (BC 2.4.2.29) - Escherichia coli	70	55	1173
313	1	2520	1414	gi 1205934	aminopeptidase a/1 (Haemophilus influenzae)	70	46	1107
355	2	379	669	gi 1070013	protein-dependent (Bacillus subtilis)	70	48	391
403	1	1255	629	gi 733147	GunF (Xanthomonas campestris)	70	33	627
444	10	8770	9273	gi 1204752	high affinity ribose transport protein (Haemophilus influenzae)	70	52	504
449	1	2	1243	gi 1619724	MotE (Bacillus firmus)	70	44	1242
472	1	637	320	gi 727145	open reading frame; putative (Bacillus amyloquelicifera) pir B25091 B25091 hypothetical protein (bglA region) - Bacillus myoliquefaciens (fragment)	70	41	318
480	2	727	1608	gi 142560	ATP synthase gamma subunit (Bacillus megaterium)	70	44	882
524	1	2	307	gi 602392	RCN2 protein (Brassica napus)	70	45	306
525	1	823	413	gi 143372	[phosphoribosyl glycinamide formyltransferase (PUB-N) (Bacillus subtilis)]	70	52	411
565	4	3625	2552	gi 1881434	ORF1 (Bacillus subtilis)	70	51	1074
607	4	829	1284	gi 151524	hypothetical protein (SP:37002) (Methanococcus jannaschii)	70	50	456
633	1	1383	703	gi 431231	luciferase (Bacillus caldolyticus)	70	53	681
646	3	1683	1309	gi 467340	unknown (Bacillus subtilis)	70	49	375
663	1	830	417	gi 1303873	Y-02 (Bacillus subtilis)	70	40	414

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
681	1	1488	781	gi 1001678	hypothetical protein [Synecocystis sp.]	70	53	708
708	1	2	448	sp P33940 YOUN_	HYPOTHETICAL 54.3 KD PROTEIN IN ECO-ALKB INTERGENIC REGION	70	51	447
725	1	51	722	gi 1001644	hypothetical protein [Synecocystis sp.]	70	48	672
776	1	1371	787	gi 145165	putative [Escherichia coli]	70	47	585
834	1	250	783	gi 552971	NADH dehydrogenase (ndhF) [Vicia faba]	70	47	534
865	2	1585	1379	gi 1204636	ATP-dependent helicase [Haemophilus influenzae]	70	45	207
894	1	535	269	gi 467364	DNA binding protein (probable) [Bacillus subtilis]	70	41	267
919	1	3	317	gi 3314847	ClnA [Bacillus subtilis]	70	40	315
944	1	3	572	gi 709991	hypothetical protein [Bacillus subtilis]	70	44	570
988	2	772	605	gi 142441	ORF 3: putative [Bacillus subtilis]	70	50	168
1055	1	3	335	gi 529755	speC [Streptococcus pyogenes]	70	37	333
1093	1	2	904	gi 853754	ABC transporter [Bacillus subtilis]	70	49	903
1109	1	2	310	gi 1001827	hypothetical protein [Synecocystis sp.]	70	42	309
1220	1	468	235	pir 523416 S234	epib protein - Staphylococcus epidermidis	70	40	234
1279	1	73	348	gi 153015	PsaA protein [Staphylococcus aureus]	70	47	276
1336	1	195	542	sp P31776 PBPB_	PENICILLIN-BINDING PROTEIN 1A (PBP-1A) [PENICILLIN-BINDING PROTEIN A]	70	50	348
1537	2	232	402	gi 1146181	putative [Bacillus subtilis]	70	50	171
1574	1	651	272	gi 219630	endothelin-A receptor [Homo sapiens]	70	47	180
1640	1	690	346	gi 1146243	22.4k identity with Escherichia coli DNA-damage inducible protein ...; putative [Bacillus subtilis]	70	46	345
2504	1	2	286	gi 495179	transmembrane protein [Lactococcus lactis]	70	51	285
3061	1	564	301	gi 508175	ERIC domain of PTS-dependent Gal transport and phosphorylation [Escherichia coli]	70	44	264
3128	1	2	199	gi 1340096	unknown [Mycobacterium tuberculosis]	70	51	198
3218	1	3	488	gi 515938	glutamate synthase (ferredoxin) [Synecocystis sp.] pir 546957 S46957	70	50	486
3323	1	794	399	gi 1154891	ATP binding protein [Phormidium laminosum]	70	52	396
3679	1	599	399	gi 529385	chromosome condensation protein [Caenorhabditis elegans]	70	30	201

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	Length (nt)
3841	1	706	398	gi1208965	hypothetical 23.3 kd protein [Escherichia coli]	70	47	309
3929	1	1	401	gi149435	putative [Lactococcus lactis]	70	49	399
4044	1	595	374	gi1602031	similar to trimethylamine DII [Mycoplasma capricolum] pir[549950] probable trimethylamine dehydrogenase (EC 5.99.7) - Mycoplasma capricolum (SGC3) [fragment]	70	40	222
4329	1	558	280	gi1339951	small subunit of NADH-dependent glutamate synthase [Plectonema boryanum]	70	49	279
4422	1	576	289	gi1296464	ATPase [Lactococcus lactis]	70	57	288
4647	1	361	200	gi166412	NADH-glutamate synthase [Medicago sativa]	70	59	162
16	8	7571	9031	gi1495620	M. jannaschii predicted coding region M20798 [Methanococcus jannaschii]	69	44	1461
16	9	9080	10033	gi1333197	thioredoxin reductase [Eubacterium acidaminophilum]	69	54	954
30	1	1452	727	gi1204910	hypothetical protein (GB:U14003_302) [Haemophilus influenzae]	69	52	726
38	4	1023	1298	gi140773	devA gene product [Anabaena sp.]	69	41	276
44	9	5987	6595	gi1205920	polyphosphate uptake system hydrophilic membrane-bound protein [Haemophilus influenzae]	69	45	609
62	15	9104	9475	gi1265178	unknown [Bacillus subtilis]	69	44	372
66	4	2402	2603	gi1303893	Vqhl [Bacillus subtilis]	69	51	402
67	15	14124	13627	gi149647	ORF2 [Listeria monocytogenes]	69	37	496
67	17	14033	14382	gi1305002	ORF_4356 [Escherichia coli]	69	49	330
67	19	15130	15807	gi1105684	ProV [Bacillus subtilis]	69	45	678
78	3	1447	2124	gi1256633	putative [Bacillus subtilis]	69	53	678
78	4	4513	3725	gi1103958	YqjG [Bacillus subtilis]	69	32	789
85	4	4521	4213	pir129326	hypothetical protein (pur operon) - Bacillus subtilis	69	32	309
86	6	3253	2654	gi1473332	OrfC [Bacillus subtilis]	69	50	600
95	1	96	710	gi1786468	4A11 antigen, sperm tail membrane antigen-putative sucrose-specific phosphotransferase enzyme II homolog (nirB, testis, Peptide Partial, 72 aa)	69	43	615
100	7	6023	7426	gi1205355	Na+/H+ antiporter [Haemophilus influenzae]	69	39	1404
102	2	2678	1650	gi1561690	salicoglycoproteinase [Pasteurella haemolytica]	69	47	1029
103	8	12241	8537	gi11009366	Respiratory nitrate reductase [Bacillus subtilis]	69	54	3705
103	11	14987	12552	gi1710020	Nitrite reductase (nirB) [Bacillus subtilis]	69	51	2436

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
112	11	8708	10168	gi154411	hexosephosphate transport protein (Salmonella typhimurium) p1r[041853] hexose phosphate transport system protein uhpT - salmonella typhimurium	69	51	1461
112	16	16644	17414	gi1204435	pyruvate formate-lyase activating enzyme (Haemophilus influenzae)	69	50	771
113	2	33	953	gi1290509	o307 (Escherichia coli)	69	43	921
114	2	1537	1058	gi1442771	reticulocyte-binding protein 1 - Plasmodium vivax	69	39	480
121	6	4309	5310	gi1154633	NrdF (Bacillus subtilis)	69	53	1002
125	2	267	854	gi1413931	ipa-7d gene product (Bacillus subtilis)	69	43	588
149	27	10666	10400	nr1528089	hypothetical protein A - Yeast (Zygosaccharomyces bisporus) p1asmid pSU3	69	39	267
161	1	1598	813	gi11205338	hypothetical protein (OB:U14003_302) (Haemophilus influenzae)	69	47	786
165	4	2222	4633	gi1440054	phenylalanyl-tRNA synthetase beta subunit (AA 1-804) (Bacillus subtilis)	69	52	2412
169	3	1210	1761	gi1296031	elongation factor Ts (Spirulina platensis)	69	45	552
175	12	8686	8339	gi1732682	FlaE protein (Escherichia coli)	69	69	348
190	2	484	1671	sp P17731 HIS8_	HISTIDINOL-PHOSPHATE AMINOTRANSFERASE (EC 2.6.1.9) (IMIDAZOLE ACETOL-PHOSPHATE TRANSAMINASE)	69	48	1188
206	1	5551	2777	gi141750	hsdr protein (AA 1-1013) (Escherichia coli)	69	49	2775
206	4	6038	5796	gi1256135	YbbF (Bacillus subtilis)	69	48	243
249	1	636	319	gi11405456	VncP (Bacillus subtilis)	69	40	118
302	8	4820	5776	gi11001768	hypothetical protein (Synecocystis sp.)	69	48	957
324	2	7384	3893	gi1256798	pyruvate carboxylase (Rhizobium etli)	69	53	3492
351	3	2098	1808	gi1491664	704H1.4 (Caenorhabditis elegans)	69	30	291
369	3	2075	2305	gi1336458	ORF (Balanoptera acutorostrata)	69	61	231
392	3	1999	2424	gi1556015	ORF1 (Bacillus subtilis)	69	45	426
410	1	87	779	gi1155611	phosphoglyceromutase (Zymomonas mobilis)	69	58	693
421	1	2085	1129	gi1276985	arginase (Bacillus caldovelox)	69	54	957
444	8	6713	7741	gi1221782	purine synthesis repressor (Haemophilus influenzae)	69	40	1029
453	1	828	415	gi1122758	unknown (Bacillus subtilis)	69	57	416
469	2	3286	2246	gi1458228	mytY homolog (Homo sapiens)	69	44	1041

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	March gene name	% sim	% ident	length (nt)
509	3	1730	1371	gi149224	USF 4 [Synecococcus sp.]	69	39	360
520	5	3023	2823	gi1726427	similar to D. melanogaster HST101-2 protein (PIR-S34154) Caenorhabditis elegans	69	39	201
531	1	26	760	gi1509672	repressor protein (Bacteriophage Tuc2009)	69	33	725
589	1	107	253	gi1169101	17.9 kDa heat shock protein (hsp17.9) [Plum sativum]	69	52	147
594	2	597	1391	gi1142783	DNA photolyase [Bacillus firmus]	69	48	795
604	4	2476	2114	gi1413930	ipa-6d gene product [Bacillus subtilis]	69	45	363
607	1	2	313	gi1226103	W08D2.3 [Caenorhabditis elegans]	69	47	312
607	2	590	312	gi1536715	ORF YBR275c [Saccharomyces cerevisiae]	69	39	279
734	1	864	433	gi1467327	unknown [Bacillus subtilis]	69	44	432
759	1	3	338	gi11009367	Respiratory nitrate reductase [Bacillus subtilis]	69	50	336
761	2	392	586	gi13508	Leucyl-tRNA synthetase (cytoplasmic) [Saccharomyces cerevisiae] [J370340 ORF YPL160w [Saccharomyces cerevisiae]	69	46	195
802	1	72	1013	gi1143044	ferrochelatase [Bacillus subtilis]	69	55	942
816	1	2573	1368	gi1510268	restriction modification system S subunit [Methanococcus jannaschii]	69	45	1206
838	2	133	387	gi1255371	coded for by C. elegans cDNA yk349.5, coded for by C. elegans cDNA yk349.3; Similar to guanilate kinase [Caenorhabditis elegans]	69	46	255
851	2	745	1005	gi1288998	secA gene product [Antihemulon sp.]	69	39	261
867	1	535	269	gi11070014	protein-dependent [Bacillus subtilis]	69	47	267
995	1	954	478	gi1205569	transcription elongation factor [Haemophilus influenzae]	69	53	477
999	1	1009	506	gi1892254	predicted trithorax protein [Drosophila virilis]	69	21	504
1127	1	1315	659	gi1205434	H. influenzae predicted coding region H1191 [Haemophilus influenzae]	69	56	657
1138	1	248	460	gi1510646	M. jannaschii predicted coding region MJ0568 [Methanococcus jannaschii]	69	48	213
2528	1	3	401	gi1290503	glutamate permease [Escherichia coli]	69	41	399
3090	1	444	223	gi1204987	DNA polymerase III, alpha chain [Haemophilus influenzae]	69	36	222
3817	1	2	400	gi11483199	peptide-synthetase [Amycolatopsis mediterranei]	69	45	399
3833	1	667	335	gi11524193	unknown [Mycobacterium tuberculosis]	69	46	333

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
4079	1	747	400	gi 546918	orf3' of coxk (Bacillus subtilis, E26, peptide partial, 140 aa) pfr S3612 S3612: hypothetical protein Y - Bacillus subtilis sp P40388 YHAD_BACSU HYPOTHETICAL PROTEIN IN CONK 3' REGION (ORFY FRAGMENT)	69	64	348
4115	2	215	400	gi 517205	67 kDa Myosin-crossreactive streptococcal antigen (Streptococcus yogenes)	69	59	186
4139	1	1	333	gi 1208451	hypothetical protein [Synecocystis sp.]	69	36	333
4258	1	457	230	gi 496158	restriction-modification enzyme subunit M1 (Mycoplasmata pulmonis) pfr S49355 S49355: HsdRI protein - Mycoplasma pulmonis (SGC3)	69	43	224
4317	1	90	374	gi 413967	lpa-4D gene product (Bacillus subtilis)	69	44	285
4465	1	3	293	gi 396296	similar to phosphotransferase system enzyme II (Escherichia coli) sp P32672 PTWC_ECOLI PTS SYSTEM, FRUCTOSE-LIKE-2 IIC COMPONENT PHOSPHOTRANSFERASE ENZYME II, C COMPONENT	69	49	291
3	1	2302	1193	gi 1109685	ProW (Bacillus subtilis)	68	46	1110
15	4	2592	2074	gi 1807973	unknown [Saccharomyces cerevisiae]	68	45	519
31	8	6328	8772	gi 290642	ATPase (Enterococcus hirae)	68	48	2445
40	2	1115	750	gi 606342	ORF_0622; reading frame open far upstream of start; possible ranshift. linking to previous ORF [Escherichia coli]	68	55	166
46	9	6886	8415	gi 155276	aldehyde dehydrogenase (Vibrio cholerae)	68	44	1530
48	3	3643	3404	gi 285608	241k polypeptide (Apple stem grooving virus)	68	47	240
48	4	3536	4132	gi 1045937	M. genitalium predicted coding region M0246 (Mycoplasma genitalium)	68	39	597
53	10	11671	10685	gi 1303952	VqJA (Bacillus subtilis)	68	46	987
70	9	7346	8155	gi 147198	pbnE protein [Escherichia coli]	68	40	810
89	4	1899	2966	gi 145173	35 kDa protein [Escherichia coli]	68	43	1068
108	1	2187	1150	gi 38722	precursor (aa -20 to 381) [Acinetobacter calcoaceticus] ir A29277 A29277 aldose 1-epimerase (EC 5.1.3.3) - Acinetobacter calcoaceticus	68	57	1038
112	5	2666	3622	gi 153724	HsIC [Streptococcus pneumoniae]	68	55	957
116	7	7865	8638	gi 143608	sporulation protein (Bacillus subtilis)	68	48	774
118	3	2484	3698	gi 1303805	Yqer (Bacillus subtilis)	68	46	1215
120	2	1424	1594	sp P38036 CVSJ_	SULFITE REDUCTASE (NADPH) FLAVOPROTEIN ALPHA-COMPONENT (EC 1.8.1.2) (SIR-FP)	68	45	171
129	1	1	1011	gi 396307	argininosuccinate lyase (Escherichia coli)	68	50	1011

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
132	3	1867	2739	gi 216267	ORF2 [Bacillus megaterium]	68	48	873
134	2	848	1012	gi 147545	DNA recombinase [Escherichia coli]	68	50	165
141	2	372	614	gi 872116	lacti (stress inducible protein) [Glycine max]	68	36	243
149	7	2454	2260	gi 145774	hsp70 protein (dnaK gene) [Escherichia coli]	68	48	195
155	2	1776	1534	gi 216583	ORF1 [Escherichia coli]	68	38	243
158	3	1826	3289	gi 193940	MYOTHEICAL 54.3 KD PROTEIN IN ECO-ALKB INTERGENIC REGION.	68	51	1464
169	6	2749	3318	gi 11403402	unknown [Mycobacterium tuberculosis]	68	46	570
175	10	9158	7365	gi 1072395	phaA gene product [Rhizobium meliloti]	68	51	1794
186	7	4184	5434	gi 1173843	3-ketoacyl-ACP synthase II [Vibrio Harveyi]	68	48	1251
189	3	907	1665	gi 467383	DNA binding protein (probable) [Bacillus subtilis]	68	55	759
206	5	7683	6709	gi 1256138	ybbt [Bacillus subtilis]	68	48	975
206	8	10425	12176	gi 452687	pyruvate decarboxylase [Saccharomyces cerevisiae]	68	48	1752
212	8	3421	3648	gi 1369541	cl gene product [Bacteriophage B1]	68	39	228
214	8	5457	6482	gi 1420467	ORF YOR196c [Saccharomyces cerevisiae]	68	45	1026
237	4	2507	3088	gi 149381	HLH [Lactococcus lactis]	68	46	582
241	5	5540	4542	gi 1235684	mevalonate pyrophosphate decarboxylase [Saccharomyces cerevisiae]	68	47	999
262	1	3	164	gi 150974	4-oxalocrotonate tautomerase [Pseudomonas putida]	68	42	162
262	2	1984	3116	gi 1147744	PSR [Enterococcus hirae]	68	49	867
276	6	3702	3139	ep 20750 ABC_E	ATP-BINDING PROTEIN ABC [FRAGMENT]	68	50	564
306	6	6345	5725	gi 1256617	adenine phosphoribosyltransferase [Bacillus subtilis]	68	53	621
333	3	4599	3850	gi 1467473	unknown [Bacillus subtilis]	68	45	750
365	6	5017	4838	gi 1130643	722B3.3 [Caenorhabditis elegans]	68	45	180
376	2	549	1646	gi 1277026	DAPA aminotransferase [Bacillus subtilis]	68	51	1098
405	1	1741	872	gi 1303917	YqjB [Bacillus subtilis]	68	47	870
406	2	853	539	gi 1511513	ABC transporter, probable ATP-binding subunit [Methanococcus jannaschii]	68	44	315
426	6	3558	3391	gi 624632	GltL [Escherichia coli]	68	48	168
438	1	108	329	gi 146923	nitrogenase reductase [Escherichia coli]	68	43	222

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
443	1	476	240	gi 535810	hippuricase [Campylobacter jejuni]	68	42	237
443	2	518	1015	gi 1204742	H. influenzae predicted coding region H10491 [Haemophilus influenzae]	68	48	498
443	5	4447	3779	gi pnc660	deoxyribose-phosphate aldolase [Bacillus subtilis] pnc[S49455]S49455 deoxyribose-phosphate aldolase [EC 4.1.2.4] - acillus subtilis	68	55	669
476	2	240	1184	gi 571345	unknown, similar to E. coli cardiolipin synthase [Bacillus subtilis] sp P41860 TNIE_BACSU HYPOTHETICAL 58.2 PROTEIN IN NARI-ACDA INTERGENIC REGION.	68	45	945
486	2	1876	1046	gi 147328	transport protein [Escherichia coli]	68	41	831
517	3	1764	2084	gi 523809	orf2 [Bacteriophage A2]	68	64	321
572	1	2	571	sp P19237 V05L	HYPOTHETICAL 6.8 KD PROTEIN IN NRDC-TK INTERGENIC REGION.	68	47	570
646	1	914	459	gi 413962	ipa-58r gene product [Bacillus subtilis]	68	52	456
659	3	1668	1901	gi 1107541	C33D9.8 [Caenorhabditis elegans]	68	36	234
864	5	1510	1716	gi 1145774	hap70 protein (dnaK gene) [Escherichia coli]	68	48	207
920	1	860	432	gi 11510416	hypothetical protein (SP:P31466) [Methanococcus jennaschii]	68	54	429
952	1	1096	611	gi C33456	reductase [Leishmania major]	68	46	486
970	1	91	402	gi 1354775	pfos/R [Treponema pallidum]	68	46	312
1028	1	1064	534	gi 151017	diaminopimelate decarboxylase [Bacillus subtilis]	68	47	531
1039	1	428	216	gi 1135714	Plasmodium falciparum mma for asparagine-rich antigen (clone 17C1) [Plasmodium falciparum]	68	31	211
1058	1	692	348	gi 181649	epic gene product [Staphylococcus epidermidis]	68	46	345
1056	2	665	465	gi 143434	Rho Factor [Bacillus subtilis]	68	43	201
1308	1	2	694	gi 1159939	group B oligopeptidase, PepB [Streptococcus agalactiae]	68	50	693
1679	1	2	238	gi 117205	67 kDa Nuclein-crossreactive streptococcal antigen [Streptococcus yogenes]	68	53	237
2039	1	3	383	gi 153898	transport protein [Salmonella typhimurium]	68	51	381
2077	1	3	326	pir C33496 C334	hsc homolog - Bacillus subtilis	68	47	324
2112	1	613	374	gi 64884	lamin LII [Xenopus laevis]	68	50	340
2273	1	793	398	gi 581648	epib gene product [Staphylococcus epidermidis]	68	45	396
2948	1	2	385	gi 216869	branched-chain amino acid transport carrier [Pseudomonas aeruginosa] pir A18534 A18534 branched-chain amino acid transport protein braz Pseudomonas aeruginosa	68	41	386

TABLE 2

S. aureus - putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	V sim	V ident	length (nt)
2955	1	768	400	gi 904179	hypothetical protein [Bacillus subtilis]	68	49	369
2981	1	572	288	gi 508979	GTP-binding protein [Bacillus subtilis]	68	48	285
3014	1	584	294	gi 1524394	ORF-2 upstream of gbaB operon [Bacillus subtilis]	68	45	291
3082	1	336	169	gi 1204696	[fructose-permease IIIC component [Haemophilus influenzae]	68	53	168
3108	1	103	258	gi 217855	heat-shock protein [Arabidopsis thaliana]	68	48	156
3639	1	919	461	gi 1510490	nitrate transport permease protein [Methanococcus jannaschii]	68	47	459
3657	1	330	330	gi 155369	PTS enzyme-II fructose [Xanthomonas campestris]	68	48	330
3823	1	780	391	gi 603768	Hut1 protein, imidazole-5-propionate hydrolase [Bacillus subtilis]	68	54	390
					gi 603768 Hut1 protein, imidazole-5-propionate hydrolase [Bacillus subtilis]			
3982	1	277	277	gi 149435	putative [Lactococcus lactis]	68	47	276
4051	1	342	342	gi 450688	hadM gene of Ecoprr1 gene product [Escherichia coli] pir[S38437/S38437 hadM protein - Escherichia coli pir[S09629/S09629 hypothetical protein A - Escherichia coli (SUB 40-520)]	68	48	342
4089	1	12	209	gi 1353678	heavy-metal transporting P-type ATPase [Proteus mirabilis]	68	47	198
4143	1	47	187	gi 603769	HutC protein, uronase [Bacillus subtilis]	68	55	141
4148	1	2	352	gi 450688	hadM gene of Ecoprr1 gene product [Escherichia coli] pir[S38437/S38437 hadM protein - Escherichia coli pir[S09629/S09629 hypothetical protein A - Escherichia coli (SUB 40-520)]	68	51	351
4173	1	2	382	gi 1041097	Pyruvate Kinase [Bacillus psychrophilus]	68	48	381
4182	1	498	250	gi 413968	lipa-44d gene product [Bacillus subtilis]	68	50	249
4362	2	148	318	gi 450688	hadM gene of Ecoprr1 gene product [Escherichia coli] pir[S38437/S38437 hadM protein - Escherichia coli pir[S09629/S09629 hypothetical protein A - Escherichia coli (SUB 40-520)]	68	44	171
5	11	9493	8300	gi 103727	[putative [Bacillus subtilis]	67	46	1194
31	11	130318	9833	gi 216746	[D-lactate dehydrogenase [Lactobacillus plantarum]	67	41	486
32	1	1560	3155	gi 1098557	renal sodium/dicarboxylate cotransporter [Homo sapiens]	67	46	1596
32	5	4945	4145	gi 1510720	[prephenate dehydratase [Methanococcus jannaschii]	67	51	801
36	5	5350	4268	gi 146216	45% identity with the product of the ORF6 gene from the Erwinia herbicola carotenoid biosynthesis cluster; putative [Bacillus subtilis]	67	58	1083
44	7	4492	5304	gi 1006621	hypothetical protein [Synecocystis sp.]	67	43	813

TABLE 2

S. aureus - putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
56	7	3943	8481	gi 304131	glutamate synthase large subunit precursor [Azospirillum brasilense] pir 346602 346602 glutamate synthase (NADPH) (EC 1.4.1.13) alpha hain - Azospirillum brasilense	67	52	4539
56	12	13923	14678	gi 1000453	TrpR [Bacillus subtilis]	67	48	756
62	8	5092	4757	gi 1113949	orf3 [Bacillus, C-125, alkali-sensitive mutant 18224, Peptide Mutant, 112 aa]	67	45	336
62	10	7570	6338	gi 654655	Na/H antiporter system [Bacillus alcalophilus]	67	49	1233
99	3	2119	3321	gi 1204349	hypothetical protein (GB:D90212.3) [Haemophilus influenzae]	67	50	1203
102	9	5695	7176	gi 149432	putative [Lactococcus lactis]	67	51	1482
103	13	14549	14049	gi 1408497	LP9D gene product [Bacillus subtilis]	67	48	501
109	15	14821	13982	gi 413976	ipa-52r gene product [Bacillus subtilis]	67	49	840
109	17	14811	15194	gi 413983	ipa-59d gene product [Bacillus subtilis]	67	29	384
121	4	1713	2153	gi 126235	YnaA [Bacillus subtilis]	67	54	441
122	1	1	1149	gi 143047	ORF8 [Bacillus subtilis]	67	35	1149
124	5	4060	3518	gi 556885	Unknown [Bacillus subtilis]	67	47	543
131	2	4584	3589	gi 1046081	hypothetical protein (GB:D36185.10) [Mycoplasma genitalium]	67	30	996
140	3	2699	2297	gi 146549	kdpC [Escherichia coli]	67	45	603
142	4	5409	4198	gi 1212775	GTP cyclohydrolase II [Bacillus amyloliquifaciens]	67	55	1212
147	5	2913	2374	gi 1303709	YrkJ [Bacillus subtilis]	67	44	540
152	8	6341	6673	gi 1377841	Unknown [Bacillus subtilis]	67	48	333
161	4	2720	3763	gi 496119	SphX [Synecoccus sp.]	67	67	1044
163	6	1989	3428	gi 595681	2-oxoglutarate/malate translocator [Spinacia oleracea]	67	47	1440
193	3	1351	1626	gi 1511101	shikimate 5-dehydrogenase [Methanococcus jannaschii]	67	53	2761
200	2	917	2179	gi 142439	ATP-dependent nuclease [Bacillus subtilis]	67	48	1263
206	10	12445	112803	sp P37347 VECD_	HYPOTHETICAL 21.8 KD PROTEIN IN ASPS 5'-REGION	67	47	357
206	11	13047	14632	gi 732813	branched-chain amino acid carrier [Lactobacillus delbrueckii]	67	46	1386
208	2	1321	809	gi 1013037	100 kDa heat shock protein (Hsp100) [Leishmania major]	67	36	513
238	3	1039	2052	gi 609542	CbrB protein [Erwinia chrysanthemi]	67	42	1014

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	Length (nt)
246	2	176	367	gi 215098	excisionase [Bacteriophage 154a]	67	37	192
276	2	2280	1412	gi 303560	ORF73 [Escherichia coli]	67	50	849
297	6	2223	3056	gi 142784	CtAA protein [Bacillus firmus]	67	46	834
307	7	5220	4186	gi 1070013	protein-dependent [Bacillus subtilis]	67	43	1035
316	1	36	1028	gi 11161061	dioxygenase [Methylobacterium extorquens]	67	52	993
324	3	5650	5030	gi 1469784	putative cell division protein [taw [Enterococcus hirae]	67	49	621
336	1	524	264	gi 173122	urea amidolyase [Saccharomyces cerevisiae]	67	45	261
100	1	108	1394	gi 130053	HISTIDYL-TRNA SYNTHETASE (EC 6.1.1.21) [HISTIDINE--TRNA LIGASE] (HISRS)	67	47	1247
364	3	4890	3592	gi 151259	HMG-CoA reductase (EC 1.1.1.88) [Pseudomonas mavalonii] pir[A44756]A44756 hydroxymethylglutaryl-CoA reductase (EC 1.1.1.88) Pseudomonas sp.	67	46	1299
365	3	2940	2113	gi 1296823	orf2 gene product [Lactobacillus helveticus]	67	47	828
367	2	325	918	gi 1039479	ORFU [Lactococcus lactis]	67	47	594
395	3	666	1271	gi 1204516	hypothetical protein [GB-U00014_4] [Haemophilus influenzae]	67	55	606
415	1	1800	901	gi 882579	[CG Site No. 29739 [Escherichia coli]	67	46	900
419	1	1799	903	gi 520752	putative [Bacillus subtilis]	67	48	897
474	1	2	796	gi 486906	argininosuccinate-synthetase [Streptomyces clavuligerus] pir[S57659]S57659 argininosuccinate synthase (EC 6.3.4.5) - streptomyces clavuligerus	67	49	795
485	2	1921	2226	gi 143434	Rho factor [Bacillus subtilis]	67	43	306
596	1	1728	865	gi 1303853	VqgF [Bacillus subtilis]	67	47	864
700	1	433	218	gi 1204628	hypothetical protein [SF-P21498] [Haemophilus influenzae]	67	47	216
806	2	249	647	gi 677947	AppC [Bacillus subtilis]	67	51	399
828	2	340	900	gi 777761	lrrA [Synecococcus sp.]	67	37	561
833	1	1407	916	gi 142996	regulatory protein [Bacillus subtilis]	67	41	492
856	1	1555	779	gi 780224	[K970.2 [Caenorhabditis elegans]	67	38	777
888	1	1614	850	gi 437315	TTG start codon [Bacillus licheniformis]	67	40	765
1034	1	1190	597	gi 1205113	hypothetical protein [GB-L19201_15] [Haemophilus influenzae]	67	45	594
1062	1	636	319	gi 1303850	VqgC [Bacillus subtilis]	67	41	318
1067	1	918	460	pir[AJ2950]AJ29	probable reductase protein - Leishmania major	67	54	459

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
1358	1	3	293	gi11001369	hypothetical protein [Synchocystis sp.]	67	44	291
2181	1	3	302	gi1510416	hypothetical protein (SP:P31466) [Methanococcus jannaschii]	67	48	300
3000	1	1	507	gi1517205	67 kDa Myosin-crossreactive streptococcal antigen [Streptococcus xyogenes]	67	56	507
3066	1	464	234	gi1308861	ORF start codon [Lactococcus lactis]	67	46	231
3087	1	454	251	gi11205366	oligopeptide transport ATP-binding protein [Haemophilus influenzae]	67	44	204
3101	1	2	256	gi11531541	uroporphyrinogen III methyltransferase [Zea mays]	67	55	255
3598	1	728	393	gi1151259	HMGR-CoA reductase (EC 1.1.1.88) [Pseudomonas mevalonit] pif144756 [Pseudomonas sp.]	67	56	336
3765	2	584	366	gi1557489	menD [Bacillus subtilis]	67	45	219
3788	1	658	398	gi155291515529	nitrate reductase alpha chain - Bacillus subtilis (fragment)	67	45	261
3883	1	2	265	gi1704397	cystathionine beta-lyase [Arabidopsis thaliana]	67	46	264
3926	1	2	340	gi11463199	peptide-synthetase [Amycolatopsis mediterranea]	67	44	339
4417	1	82	196	gi11205337	ribonucleotide transport ATP-binding protein [Haemophilus influenzae]	67	46	315
2	3	3075	1989	gi1535348	CodV [Bacillus subtilis]	66	42	915
15	6	2273	2542	gi1146491	SmcB [Synchococcus PCC7942]	66	37	270
31	9	8059	7826	gi1232046	luciferin [Momo supina]	66	44	234
31	10	9034	9258	gi12204545	mercury scavenger protein [Haemophilus influenzae]	66	48	225
32	6	6347	5253	gi1998342	inducible nitric oxide synthase [Gallus gallus]	66	47	1095
44	13	8856	10124	gi11510751	polydenuum cofactor biosynthesis moaA protein [Methanococcus jannaschii]	66	46	1289
48	2	1276	2868	gi1150209	ORF 1 [Mycoplasma mycoides]	66	40	1593
58	8	7178	8428	gi11665999	hypothetical protein [Bacillus subtilis]	66	47	1251
62	7	5143	4370	gi11072398	lpdA gene product [Rhizobium meliloti]	66	40	774
70	14	11693	10998	gi1809660	deoxyribose-phosphate aldolase [Bacillus subtilis] pif1549455 [S49455] deoxyribose-phosphate aldolase (EC 4.1.2.4) - acillus subtilis	66	55	696
76	1	1	1305	gi1142440	ATP-dependent nuclease [Bacillus subtilis]	66	42	1305
91	6	9236	8205	gi1704397	cystathionine beta-lyase [Arabidopsis thaliana]	66	43	1032
102	5	3810	3265	gi12206223	hypothetical protein (SP:P31805) [Haemophilus influenzae]	66	41	546

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
103	4	3418	2732	gi 971344	nitrate reductase alpha subunit [Bacillus subtilis] sp P42177 NARI_BACSU NITRATE REDUCTASE GAMMA CHAIN [EC 1.7.99.4] gi 1009369 Respiratory nitrate reductase [Bacillus subtilis] (sub -160)	66	48	687
109	6	4243	4674	gi 170886	glucosamine-6-phosphate deaminase [Candida albicans] pIR A46632 A46632 glucosamine-6-phosphate isomerase [EC 5.3.1.10] - east [Candida albicans]	66	45	432
112	17	17491	13712	gi 1333179	ORF YGR11W [Saccharomyces cerevisiae]	66	33	222
116	2	4667	2637	gi 1491813	gamma-glutamyltranspeptidase [Bacillus subtilis]	66	43	2031
150	5	3189	3989	gi 1146224	[putative [Bacillus subtilis]	66	30	201
172	5	3284	3662	gi 755152	[highly hydrophobic integral membrane protein [Bacillus subtilis] sp P42953 TAGC_BACSU TEICHOIC ACID TRANSLLOCATION PERMEASE PROTEIN AGG.	66	41	399
174	5	4592	3723	gi 1146241	pantothenate synthetase [Bacillus subtilis]	66	49	870
175	4	3209	2880	gi 642655	unknown [Rhizobium meliloti]	66	29	330
175	11	8743	7994	gi 854655	Na/H antiporter system [Bacillus alcalophilus]	66	43	750
190	5	7079	5727	gi 451072	di-tripeptide transporter [Lactococcus lactis]	66	40	1353
195	15	13919	13713	gi 1322411	unknown [Mycobacterium tuberculosis]	66	42	207
217	3	2822	2595	gi 1143542	alternative stop codon [Rattus norvegicus]	66	36	228
233	9	7133	6135	gi 1458327	P08F3.4 gene product [Caenorhabditis elegans]	66	47	999
218	1	41	1041	gi 809541	ChrA protein [Brwinia chrysanthemi]	66	42	994
241	1	2102	1053	gi 153067	peptidoglycan hydrolase [Staphylococcus aureus]	66	53	1050
261	1	1178	648	gi 1510859	M. jannaschii predicted coding region M0790 [Methanococcus jannaschii]	66	40	531
263	3	3731	2973	gi 1205865	tetrahydrodipicolinate N-succinyltransferase [Haemophilus influenzae]	66	47	759
272	8	6548	5404	gi 882101	high affinity nickel transporter [Alcaligenes eutrophus] sp P23516 HXM_AUCSU HIGH-AFFINITY NICKEL TRANSPORT PROTEIN.	66	44	1065
276	3	2805	2104	gi 1208965	hypothetical 23.3 kd protein [Escherichia coli]	66	47	702
278	2	2830	1784	gi 1488662	phosphatase-associated protein [Bacillus subtilis]	66	48	1047
278	3	3630	2952	gi 303560	ORF271 [Escherichia coli]	66	45	879
279	2	3894	2218	gi 1185289	2-succinyl-6-hydroxy-2,4-cyclohexadiene-1- carboxylate synthase [Bacillus subtilis]	66	48	1677
288	4	2535	2275	gi 1256625	[putative [Bacillus subtilis]	66	42	261
292	2	1133	942	gi 1511604	M. jannaschii predicted coding region M1651 [Methanococcus jannaschii]	66	30	192

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
294	1	1116	559	gi 216314	esterase [Bacillus stearothermophilus]	66	45	558
297	4	2913	1978	gi 1994794	cytochrome a assembly facto [Bacillus subtilis] sp P24009 COXII_BACSU PROBABLE CYTOCHROME C OXIDASE ASSEMBLY FACTOR	66	45	936
316	4	2053	2682	gi 1107839	leiginate lyase [Pseudomonas aeruginosa]	66	40	630
338	4	2460	2302	gi 520750	biotin synthetase [Bacillus sphaericus]	66	50	159
339	1	1214	735	gi 467468	7, 8-dihydro-6-hydroxymethylpterin-pyrophosphokinase [Bacillus subtilis]	66	52	480
363	1	3	863	gi 581649	epic gene product [Staphylococcus epidermidis]	66	47	863
366	2	232	483	gi 1103505	unknown [Schizosaccharomyces pombe]	66	53	252
367	4	2468	1845	sp P20692 TYRA_	PREPHENATE DEHYDROGENASE (EC 1.3.1.12) (PDH)	66	50	624
372	3	2150	1599	gi 467416	unknown [Bacillus subtilis]	66	38	552
378	1	212	1009	gi 147309	purine nucleoside phosphorylase [Escherichia coli]	66	50	798
401	1	1	462	gi 388263	p-aminobenzoic acid synthase [Streptomyces griseus] p JN0531 JN0531 p-aminobenzoic acid synthase - Streptomyces riseus	66	46	462
404	7	4826	5254	gi 606744	cytidine deaminase [Bacillus subtilis]	66	51	429
411	2	1738	1103	gi 1460081	unknown [Mycobacterium tuberculosis]	66	44	636
420	1	2	541	gi 1046024	[Na+ ATPase subunit J] [Mycoplasma genitalium]	66	49	540
431	1	1	858	gi 1500008	M. jannaschii predicted coding region M0154 (Methanococcus jannaschii)	66	50	858
443	7	5679	5299	gi 852076	MrgA [Bacillus subtilis]	66	46	381
444	3	3405	2433	gi 153047	lysostaphin (tcp start codon) [Staphylococcus simulans] p J25881 J25881 lysostaphin precursor - Staphylococcus simulans sp P10547 LSTP_STASI LYSOSTAPHIN PRECURSOR (EC 3.5.1.-)	66	51	993
561	1	956	480	gi 1204905	DNA-3-methyladenine glycosylase I [Haemophilus influenzae]	66	45	477
562	3	1086	1383	gi 1046082	M. genitalium predicted coding region M0172 [Mycoplasma genitalium]	66	52	318
576	1	11	724	gi 305014	ORF_0334 [Escherichia coli]	66	43	714
577	3	1190	903	gi 1001353	hypothetical protein [Synachocytis sp.]	66	52	288
584	1	2	331	sp P24204 YEBA_	HYPOTHETICAL 46.7 KD PROTEIN IN MSBB-RUVB INTERGENIC REGION (ORFU)	66	48	330
592	1	1410	706	gi 928839	ORF266; putative [Lactococcus lactis phage BK5-T]	66	51	705
601	1	1433	720	gi 1488695	novel antigen: orf-2 [Staphylococcus aureus]	66	55	714

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
619	3	468	845	gi 746573	similar to H. musculus transport system membrane protein, Nramo PIR-A40739 and S. cerevisiae SHP1 protein [PIR-A5154] <i>Ceanothobdittis elegans</i>	66	45	378
706	2	561	355	gi 804808	unknown protein [Rattus norvegicus]	66	46	207
734	2	673	312	gi 1519085	phosphatidylcholine binding immunoglobulin heavy chain IgM variable region [Mus musculus]	66	60	162
740	1	3	317	gi 1209272	arginosuccinate-lyase [Campylobacter jejuni]	66	47	315
764	1	310	747	gi 435296	alkaline phosphatase like protein [Lactococcus lactis] pIR[S39339]S39339 alkaline phosphatase-like protein - Lactococcus actis	66	42	438
852	1	338	171	gi 536955	CG site No. 361 [Escherichia coli]	66	43	168
886	1	3	158	gi 289272	ferrichrome-binding protein [Bacillus subtilis]	66	44	156
889	1	462	232	gi 833061	HCMVUL77 (AA 1-642) [Human cytomegalovirus]	66	66	231
893	1	2	247	gi 149008	putative [Helicobacter pylori]	66	45	246
900	1	1455	733	gi 580842	[F3] [Bacillus subtilis]	66	51	693
906	2	2300	1473	gi 790945	acyl-alcohol dehydrogenase [Bacillus subtilis]	66	53	828
947	1	79	549	gi 410117	diaminopimelate decarboxylase [Bacillus subtilis]	66	47	471
950	1	1100	552	gi 48713	orf145 [Staphylococcus aureus]	66	35	549
955	2	89	475	gi 1204390	uridine kinase uridine monophosphokinase) [Haemophilus influenzae]	66	50	387
981	2	1308	997	gi 457146	rhostry protein [Plasmodium yoelii]	66	18	312
986	1	25	315	gi 305002	ONF_1356 [Escherichia coli]	66	31	291
1057	1	3	203	gi 1303853	Yqgp [Bacillus subtilis]	66	40	201
1087	1	1	294	gi 575913	unknown [Saccharomyces cerevisiae]	66	53	294
1105	1	1	231	gi 1045799	methylgalactoside permease ATP-binding protein [Mycoplasma genitalium]	66	46	231
1128	1	2	574	gi 1001493	hypothetical protein [Synchocystis sp.]	66	46	573
1150	1	498	250	gi 1499034	M. jenneaehii predicted coding region MJ0255 [Methanococcus jenneaehii]	66	40	249
1180	2	707	453	gi 215908	DNA polymerase [g43] [Bacteriophage T4]	66	46	255
1208	1	1123	587	gi 1256653	DNA-binding protein [Bacillus subtilis]	66	58	537
1342	1	1	402	gi 1208474	hypothetical protein [Synchocystis sp.]	66	53	402
1761	2	589	398	gi 215811	tail fiber protein [Bacteriophage T3]	66	50	192

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
1903	1	499	251	gi11045935	DNA helicase II (Mycoplasma genitalium)	66	40	249
2101	2	176	400	gi1929798	precursor for the major merozoite surface antigens (Plasmodium alciptarum)	66	46	225
2341	1	373	188	gi11256623	exodeoxyribonuclease (Bacillus subtilis)	66	38	186
2458	1	335	164	gi11019410	unknown [Schizosaccharomyces pombe]	66	47	162
2505	1	468	235	gi11510394	putative transcriptional regulator (Methanococcus jennaschii)	66	39	234
2525	1	558	280	gi11000695	cytoxin L (Clostridium ordellii)	66	44	279
2935	1	3	275	gi1765073	autolysin (Staphylococcus aureus)	66	47	273
3005	1	114	305	gi11205784	heterocyst maturation protein (Haemophilus influenzae)	66	46	192
3068	1	80	277	gi11303813	Vqvw (Bacillus subtilis)	66	42	198
3071	1	1	189	gi11070014	protein-dependent (Bacillus subtilis)	66	41	189
3081	1	404	225	gi1984212	unknown [Schizosaccharomyces pombe]	66	44	180
3090	2	580	386	gi11204987	DNA polymerase III, alpha chain (Haemophilus influenzae)	66	48	195
3118	1	1	387	gi11009366	respiratory nitrate reductase (Bacillus subtilis)	66	49	387
3739	1	798	400	gi11109684	ProV (Bacillus subtilis)	66	47	399
3796	1	402	202	gi11853760	acyl-CoA dehydrogenase (Bacillus subtilis)	66	60	201
4124	1	575	347	gi1563932	gluconate permease (Bacillus licheniformis)	66	46	249
4240	1	3	350	gi1151259	HMGR-CoA reductase (EC 1.1.1.88) [Pseudomonas mevalonii] p1r[A44756][A44756] Pseudomonas sp.	66	51	348
4604	1	7	234	pir[A26713]BMMC	hydroxymethylglutaryl-CoA reductase (EC 1.1.1.88) Pseudomonas sp.	66	46	228
4	9	8845	9750	gi1145646	hemocyanin subunit II - Atlantic horseshoe crab	65	35	906
6	5	2708	3565	gi1887824	cysR (Escherichia coli)	65	47	858
13	1	1993	998	gi1143402	ORF_0110 [Escherichia coli]	65	44	996
15	7	2493	3524	gi11403126	recombination protein (ttg start codon) (Bacillus subtilis) gi1103923 RecN [Bacillus subtilis]	65	38	1032
18	3	1308	1372	gi1349187	czcd gene product (Alcaligenes eutrophus)	65	50	537
21	3	1467	2492	gi1149518	acyltransferase (Saccharomyces cerevisiae)	65	52	1026
25	4	3374	4312	gi11502420	phosphoribosyl anthranilate transferase (Lactococcus lactis) p1r[S35126][S35126] anthranilate phosphoribosyltransferase (EC 4.2.1.8) - Lactococcus lactis subsp. lactis	65	44	939

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
27	2	390	626	gi11212729	Yqj3 (Bacillus subtilis)	65	45	237
31	12	11040	10387	gi1509245	D-hydroxyisocaproate dehydrogenase (Lactobacillus delbrueckii)	65	41	654
38	24	19172	19528	gi1547	M-protein (Plasmodium falciparum)	65	41	357
44	2	790	1746	gi1405882	YekK (Escherichia coli)	65	46	957
44	12	9356	8822	gi11205905	polydenu cofactor biosynthesis protein (Haemophilus influenzae)	65	50	525
45	8	6635	7588	gi1493074	Apba protein (Salmonella typhimurium)	65	46	954
51	2	580	1503	gi1580897	OppB gene product (Bacillus subtilis)	65	45	924
52	1	225	953	gi11205318	NAD(P)H-flavin oxidoreductase (Haemophilus influenzae)	65	45	729
55	4	1139	1038	gi1444591444	tropomyosin T beta TmT-5 - rabbit	65	41	282
67	9	7421	8272	gi1143607	sporulation protein (Bacillus subtilis)	65	42	852
73	5	4466	5375	gi11204896	lysophospholipase L2 (Haemophilus influenzae)	65	37	930
74	1	934	478	gi11204844	H. influenzae predicted coding region H10594 (Haemophilus influenzae)	65	50	477
77	1	2	757	gi11046082	M. genitalium predicted coding region M0372 (Mycoplasma genitalium)	65	46	756
77	2	795	1433	gi11222116	permease (Haemophilus influenzae)	65	37	639
81	3	4728	3454	gi11001708	hypothetical protein (Synchocystis sp.)	65	49	1275
91	7	8548	8357	gi11399263	cystathionine beta-lyase (Emerella nidulans)	65	40	192
98	3	1608	1988	gi1467423	unknown (Bacillus subtilis)	65	38	381
98	4	2250	2987	gi1467424	unknown (Bacillus subtilis)	65	45	738
102	3	2598	2119	gi11511532	N-terminal acetyltransferase complex, subunit ARD1 (Methanococcus jannaschii)	65	39	480
102	4	3647	2862	gi11204637	H. influenzae predicted coding region H10388 (Haemophilus influenzae)	65	32	786
103	9	10851	9841	gi1142695	S-adenosyl-L-methionine:uroporphyrinogen III methyltransferase Bacillus megaterium	65	47	1011
103	10	10439	10119	gi11710021	nitrite reductase (nirD) (Bacillus subtilis)	65	51	321
106	2	262	1140	gi1139881	ORF 311 (AA 1-311) (Bacillus subtilis)	65	44	879
109	5	1909	4268	gi11204399	glucosamine-6-phosphate deaminase protein (Haemophilus influenzae)	65	44	360
109	10	7165	8595	gi1536955	ICG Site No. 361 (Escherichia coli)	65	41	1431

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
110	4	3688	3915	gi 407681	stringent response-like protein [Streptococcus equisimilis] pIR[S39975]S39975 stringent response-like protein - Streptococcus equisimilis	65	45	228
110	5	3882	4295	gi 407680	ORF1 [Streptococcus equisimilis]	65	50	414
110	6	4231	4380	gi 1133574	Orf2 [Streptomyces griseus]	65	56	150
112	10	9218	8640	gi 1204571	H. influenzae predicted coding region H10318 [Haemophilus influenzae]	65	52	579
112	12	12049	11288	gi 710496	transcriptional activator protein [Bacillus brevis]	65	32	762
125	1	2	202	gi 1151158	repeat organellar protein [Plasmodium chabaudi]	65	39	201
126	1	3	422	gi 37589	precursor [Homo sapiens]	65	46	420
127	11	10711	12658	gi 1064809	homologous to sp:UTRA_ECOL1 [Bacillus subtilis]	65	41	1926
143	8	7543	7004	gi 216513	mutator mutT [AT-GC transversion] [Escherichia coli]	65	56	540
145	5	3587	3838	gi 11209768	D02_orf569 [Mycoplasma pneumoniae]	65	27	252
150	4	3482	2841	gi 1146225	putative [Bacillus subtilis]	65	37	642
166	1	3858	1948	gi 1148304	[beta-1,4-N-acetylmuramoylhydrolase [Enterococcus hirae] pIR[A42296]A42296 lysozyme 2 [EC 3.2.1.-] precursor - Enterococcus irae [ATCC 9790]	65	50	1911
188	6	3195	4178	gi 1151943	ORF3; putative [Rhodobacter capsulatus]	65	46	984
189	9	4082	4785	gi 158812	ORF IV [AA 1-482] [Flgmit mosaic virus]	65	40	198
195	6	7900	5272	gi 145220	[alanyl-tRNA synthetase [Escherichia coli]	65	49	2637
195	7	110599	8104	gi 882711	exonuclease V alpha-subunit [Escherichia coli]	65	38	2496
206	16	116896	18191	gi 1408115	ornithine acetyltransferase [Bacillus subtilis]	65	53	1296
217	4	3844	3215	gi 1205974	5'-guanylate kinase [Haemophilus influenzae]	65	41	630
220	4	3265	3751	gi 580920	rodd [gtaA] polypeptide [AA 1-673] [Bacillus subtilis] pIR[S06048]S06048 probable rodd protein - Bacillus subtilis sp:P3484[TRAC_BACSU] PROBABLE POLY(GLYCEROL-PHOSPHATE) LIPID-GLUCOSYLTRANSFERASE [EC 2.4.1.52] (TECHNOIC ACID BIOSYNTHESIS ROUTE IN E.)	65	40	1515
236	5	2327	3709	gi 11146200	DNA or RNA helicase, DNA-dependent ATPase [Bacillus subtilis]	65	46	1381
237	3	1902	2513	gi 149379	Hslad [Lactococcus lactis]	65	46	612
241	4	4968	4195	gi 1205308	ribonuclease HII [EC 3.1.264] [RNase HII] [Haemophilus influenzae]	65	50	774
252	1	1278	940	gi 1204989	hypothetical protein [GB-U00022.9] [Haemophilus influenzae]	65	40	339
261	5	4780	3794	gi 145527	[ecd [Escherichia coli]	65	43	987

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
274	1	3	278	gi 496558	orfX (Bacillus subtilis)	65	42	276
301	2	982	815	gi 67418	unknown (Bacillus subtilis)	65	45	168
307	4	3586	2864	gi 070014	protein-dependent (Bacillus subtilis)	65	40	723
335	2	2286	1399	gi 46913	N-acetylglucosamine transport protein (Escherichia coli) pir B99895 MQC2N phosphotransferase system enzyme II (EC 7.1.69), N-acetylglucosamine-specific - Escherichia coli sp P09223 PTAA_ECOLI PTS SYSTEM, N-ACETYLGLUCOSAMINE-SPECIFIC IIABC ONPONENT (EIIA	65	50	888
338	5	4120	3170	gi 1277029	biotin synthase (Bacillus subtilis)	65	49	951
343	3	1490	2800	gi 143264	membrane-associated protein (Bacillus subtilis)	65	48	1311
344	4	2761	2531	gi 1050540	rRNA-glucanase synthetase (Lupinus luteus)	65	34	231
358	3	3421	3621	gi 1146220	NAD+ dependent glycerol-3-phosphate dehydrogenase (Bacillus subtilis)	65	47	201
364	1	238	699	gi 1340128	ORF1 (Scaphylococcus aureus)	65	51	462
379	1	1	576	gi 143331	alkaline phosphatase regulatory protein (Bacillus subtilis) pir A27650 A27650 regulatory protein phor - Bacillus subtilis sp P23345 PHOR_BACSU ALKALINE PHOSPHATASE SYNTHESIS SENSOR PROTEIN HOR (EC 2.7.3.-)	65	40	576
379	3	3666	4346	gi 143268	dihydroilpoamide transuccinylase (odhB, EC 2.3.1.61) (Bacillus subtilis)	65	50	681
428	1	187	483	gi 1420465	ORF YOR195W (Saccharomyces cerevisiae)	65	45	297
434	2	272	818	gi 143498	deg5 protein (Bacillus subtilis)	65	38	567
444	11	9280	10215	gi 1204756	ribokinase IIIaemophilus influenzae	65	47	936
449	2	1241	1531	gi 599848	Ha/H antiporter homolog (Lactococcus lactis)	65	41	291
478	2	1452	865	gi 1045942	glycyl-tRNA synthetase (Mycoplasma genitalium)	65	39	588
479	1	1032	517	gi 1498192	putative (Pseudomonas aeruginosa)	65	40	516
480	6	4312	5637	gi 415662	UDP-N-acetylglucosamine 1-carboxyvinyl transferase (Acinetobacter alcoaceticus)	65	48	1326
484	1	2	430	gi 124651	transmembrane protein (kdpD) (Escherichia coli)	65	44	429
499	1	54	932	gi 1601456	reductase (Leishmania major)	65	53	879
505	1	914	459	gi 1518853	OafA (Salmonella typhimurium)	65	39	456
571	2	1509	843	gi 49399	open reading frame upstream glrE (Escherichia coli) ir S37754 S37754 hypothetical protein XE (glrE 5' region) - Escherichia coli	65	44	627
611	2	506	270	gi 10961	RAP-2 (Plasmodium falciparum)	65	40	237

TABLE 2

TABLE 2

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
705	1	564	283	gi 710020	nitrite reductase (nirB) [Bacillus subtilis]	65	52	282
712	1	1	177	gi 289272	[ferrichrome-binding protein (Bacillus subtilis)]	65	37	177
712	2	196	356	gi 289272	[ferrichrome-binding protein (Bacillus subtilis)]	65	37	159
743	1	2	631	gi 310631	ATP binding protein [Streptococcus gordonii]	65	45	630
749	2	393	779	gi 167374	[single strand DNA binding protein [Bacillus subtilis]]	65	29	387
762	1	1698	850	gi 1160399	[multidrug resistance protein [Plasmodium falciparum]]	65	48	849
788	1	85	315	gi 1129096	[unknown protein [Bacillus sp.]]	65	35	231
850	1	1	408	gi 1006604	[hypothetical protein [Synecocystis sp.]]	65	37	408
908	1	1	444	gi 1199546	[2362 [Saccharomyces cerevisiae]]	65	46	444
925	1	1	174	gi 1256653	[DNA-binding protein [Bacillus subtilis]]	65	54	174
1031	1	26	232	gi 238657	[AppCacyochrome d oxidase, subunit I homolog [Escherichia coli, K12, epsilon, 514 aa]]	65	47	207
1037	1	414	262	gi 1491813	[gamma-glutamyltranspeptidase [Bacillus subtilis]]	65	46	153
1053	1	348	175	gi 642655	[unknown [Rhizobium mullii]]	65	34	174
1149	1	1399	752	gi 1162980	[ribulose-5-phosphate 3-epimerase [Spinacia oleracea]]	65	48	648
1214	1	881	495	gi 1205959	[lactam utilization protein [Haemophilus influenzae]]	65	45	387
1276	1	476	276	gi 535493 5354	[site-specific DNA-methyltransferase SteI (EC 2.1.1.-) - Stenotrophomonas sanguis]	65	37	201
1276	2	900	577	gi 473794	[ORF [Escherichia coli]]	65	34	324
2057	1	272	138	gi 633699	[TraH [Yersinia enterocolitica]]	65	21	135
2521	1	336	169	gi 1045789	[hypothetical protein [CB-010003.76] [Mycoplasma genitalium]]	65	41	168
2974	1	590	297	gi 1152052	[enantiomerase-selective amidase [Rhodococcus sp.]]	65	45	294
3031	1	306	154	gi 101024 J010	[hypothetical JNK protein [DmK140 5' region] - fruit fly [Drosophila melanogaster]]	65	47	153
3069	1	3	278	gi 1144906	[product homologous to E. coli thioredoxin reductase: J Biol. Chem. 1988) 261:9015-9019, and to F52a protein of alkyl hydroperoxide oxidase from S. typhimurium: J Biol. Chem. (1990) 265:10535-10540; pan reading frame A [Clostridium pasteurianum]]	65	46	276
3146	1	282	142	gi 49315	[ORF1 gene product [Bacillus subtilis]]	65	47	141
3170	1	679	341	gi 1507711	[indolepyruvate decarboxylase [Erwinia herbicola]]	65	44	339

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
3546	1	1	303	gi1450688	hsm gene of E. coli gene product [Escherichia coli] p1r[S38437]S38437 hsm protein - Escherichia coli p1r[S09629]S09629 hypothetical protein A - Escherichia coli (SUB 40-520)	65	42	303
3782	1	2	328	gi166412	INADH-glutamate synthase [Medicago sativa]	65	42	327
3990	1	374	189	gi1009366	respiratory nitrate reductase [Bacillus subtilis]	65	53	186
4031	1	613	308	gi1132127	ORF YGR087c [Saccharomyces cerevisiae]	65	50	306
4278	2	726	364	gi11197667	vitellogenin [Anolis pulchellus]	65	42	363
19	4	4259	5518	gi145727	dead [Escherichia coli]	64	45	1260
19	6	7639	6926	gi11016232	lyc27 gene product [Cyanophora paradoxa]	64	36	714
20	8	7053	6454	gi1765073	autolysin [Staphylococcus aureus]	64	47	600
31	13	112706	11537	gi1414009	ipe-BSD gene product [Bacillus subtilis]	64	45	1170
33	4	2388	4364	gi11204696	fructose-permease IIBC component [Haemophilus influenzae]	64	47	1977
36	3	1871	3013	gi1290503	glutamate permease [Escherichia coli]	64	40	1143
37	6	4065	4409	gi139815	orf 2 gene product [Bacillus subtilis]	64	46	345
45	9	7852	8760	gi1230585	nucleotide sugar epimerase [Vibrio cholerae O139]	64	53	909
53	3	1540	1899	gi1303961	YQJ3 [Bacillus subtilis]	64	50	360
56	6	4793	3855	gi1457514	glc [Bacillus subtilis]	64	45	939
56	124	30002	30247	gi1270331	similar to zinc fingers [Caenorhabditis elegans]	64	42	246
62	4	2759	2421	gi1642655	unknown [Rhizobium meliloti]	64	28	339
85	6	7178	6027	gi1457702	5-aminimidazole ribonucleotide-carboxylase [Pichia methanolica] p1r[S39112]S39112 phosphoribosylaminimidazole carboxylase (EC 1.1.21) - yeast [Pichia methanolica]	64	46	1152
96	9	9251	10030	gi11511513	ABC transporter, probable ATP-binding subunit [Methanococcus jannaschii]	64	42	780
100	1	1	600	gi1765073	autolysin [Staphylococcus aureus]	64	44	600
106	5	3868	4854	gi1466778	lysine specific permease [Escherichia coli]	64	46	987
123	2	838	554	gi1467484	unknown [Bacillus subtilis]	64	47	285
127	8	7514	7810	gi1210061	serotype-specific antigen [African horse sickness virus] p1r[S27891]S27891 capsid protein VP2 - African horse sickness virus	64	28	297
131	7	7134	6721	gi11511160	M. jannaschii predicted coding region M1163 [Methanococcus jannaschii]	64	46	414

TABLE 2

S aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
142	5	5405	4817	gi11173517	riboflavin synthase alpha subunit [Actinobacillus pleuropneumoniae]	64	44	639
143	1	709	356	gi1429501329	probable reductase protein - Leishmania major	64	52	354
149	10	3555	3295	gi1398151	major surface antigen MSG2 [Pneumocystis carinii]	64	44	261
154	4	3134	2307	gi1984587	Dmp [Escherichia coli]	64	50	828
161	5	3855	4880	gi1903104	ORF72 [Bacillus subtilis]	64	37	1026
165	1	33	791	gi1467483	unknown [Bacillus subtilis]	64	38	759
175	6	6355	4216	gi11072398	phaD gene product [Rhizobium meliloti]	64	42	1512
188	3	2042	2500	gi11001961	MHC class II analog [Staphylococcus aureus]	64	45	459
195	14	13667	13446	gi1396380	No definition line found [Escherichia coli]	64	47	222
206	15	16429	16938	gi1304134	argC [Bacillus stearothermophilus]	64	49	510
215	1	560	282	gi1142359	ORF 6 [Azotobacter vinelandii]	64	39	279
243	7	7818	6928	gi1414014	ipa-90d gene product [Bacillus subtilis]	64	49	891
258	2	1330	845	gi1664754	p17 [Listeria monocytogenes]	64	38	486
259	1	462	232	gi11499663	M. jannaschii predicted coding region M0837 [Methanococcus jannaschii]	64	52	231
263	6	6565	5567	gi1142828	aspartate semialdehyde dehydrogenase [Bacillus subtilis] sp Q04797 DHAS_DACSU ASPARTATE-SEMIALDEHYDE DEHYDROGENASE (EC 2.1.11) [ASA DEHYDROGENASE]	64	48	999
271	1	3	1163	gi1467091	hflX; B2235_C2-202 [Mycobacterium leprae]	64	44	1161
280	1	173	1450	gi13301839	YqR [Bacillus subtilis]	64	43	1278
293	1	2532	1267	gi1147345	primosomal protein n' [Escherichia coli]	64	45	1266
295	2	742	1488	gi1459266	Potential membrane spanning protein [Staphylococcus hominis] pir S42932 S42932 potential membrane spanning protein - taphylococcus hominis	64	39	747
301	5	1625	1446	gi1580835	lysine decarboxylase [Bacillus subtilis]	64	35	180
315	4	5064	3949	gi1143396	quinol oxidase [Bacillus subtilis]	64	45	1116
321	1	1264	635	gi1710496	transcriptional activator protein [Bacillus brevis]	64	41	630
333	5	4520	4239	gi13314295	ORF2; putative 19 kDa protein [Listeria monocytogenes]	64	43	282
342	1	1	549	gi1142940	fteA [Bacillus subtilis]	64	38	549
353	3	2878	2324	gi1537049	ORF_0470 [Escherichia coli]	64	44	555

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
379	2	827	3658	gi 525295 A328	oxoglutarate dehydrogenase (lipamide) [EC 1.2.4.2] - Bacillus subtilis	64	47	2832
404	6	4429	4839	gi A36933 A369	diacylglycerol kinase homolog - Streptococcus mutans	64	35	411
407	1	2020	1133	gi 969026	orfX [Bacillus subtilis]	64	41	888
425	1	1109	591	gi 1146177	phosphotransferase system glucose-specific enzyme II [Bacillus subtilis]	64	44	519
443	6	4082	4798	gi 147709	purine nucleoside phosphorylase [Escherichia coli]	64	51	717
450	2	1035	1604	gi c06376	ORF_0182 [Escherichia coli]	64	38	570
470	5	1680	6107	gi 1369948	host interacting protein [Bacteriophage B1]	64	45	4428
486	4	1911	1471	gi 1205582	spermidine/putrescine transport system permease protein [Haemophilus influenzae]	64	35	441
497	1	2217	1159	sp P36929 PMU_E	PMU PROTEIN	64	38	1059
501	1	3	410	gi 142450	ehcC protein [Bacillus subtilis]	64	38	408
514	1	3	290	gi 1204496	H. influenzae predicted coding region H10238 [Haemophilus influenzae]	64	34	288
551	4	3162	3323	gi 1204511	bacterioferitin comigratory protein [Haemophilus influenzae]	64	41	162
603	4	759	956	gi 1755823	NADH dehydrogenase F [Streptococcus americana]	64	35	198
653	2	940	746	gi 213234	dicarboxylic amino acids Dip5p permease [Saccharomyces cerevisiae]	64	41	195
660	3	3801	2257	sp P46133 YDAM_L	HYPOTHETICAL PROTEIN IN OCT 5' REGION (FRAGMENT)	64	39	1345
695	1	11	502	gi 1001383	hypothetical protein [Synechocystis sp.]	64	41	492
702	1	3	752	gi 142865	DNA primase [Bacillus subtilis]	64	46	750
826	1	1	339	gi 971336	arginyl tRNA synthetase [Bacillus subtilis]	64	50	339
838	1	1831	917	gi 1334775	lofS/R [Treponema pallidum]	64	41	915
864	3	675	944	gi 139833	cyclomaltodextrin glucanotransferase [Bacillus earothermophilus]	64	47	270
887	1	3	677	gi 153002	enterotoxin type E precursor [Staphylococcus aureus] p1r[A28179/A28179]	64	46	675
928	2	1172	963	gi 111976	fibrinogen-binding protein [Staphylococcus aureus] p1r[SJ4270/SJ4270]	64	41	210
1049	2	800	606	gi 1049115	Rap60 [Bacillus subtilis]	64	42	195
1067	2	999	748	gi 1151072	hhdA precursor [Haemophilus ducreyi]	64	50	252

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
1120	1	50	202	gi1142439	ATP-dependent nuclease [Bacillus subtilis]	64	30	153
1125	1	751	377	gi1581648	lepiB gene product [Staphylococcus epidermidis]	64	44	375
1688	1	402	214	gi1401365	transforming protein K-tes - mouse	64	47	189
2472	1	2	358	gi1487282	[Na ⁺ -ATPase subunit J [Enterococcus hirae]	64	36	357
2989	1	520	356	gi1304134	laroC [Bacillus stearothermophilus]	64	50	165
3013	1	630	152	gi1551699	cytochrome oxidase subunit 1 [Bacillus firmus]	64	51	279
3034	1	546	274	gi11204349	hypothetical protein GB:G8:090212.3 [Haemophilus influenzae]	64	50	273
3197	1	613	308	gi11009366	Respiratory nitrate reductase [Bacillus subtilis]	64	46	306
3303	1	90	362	gi11107839	alginate lyase [Pseudomonas aeruginosa]	64	43	273
3852	2	82	288	gi1216746	D-lactate dehydrogenase [Lactobacillus plantarum]	64	42	207
3868	1	1	312	gi1149435	putative [Lactococcus lactis]	64	48	312
3918	1	660	331	gi15532	acetyl-CoA acyltransferase [Yarrowia lipolytica]	64	46	330
4000	1	112	378	gi1944688	unknown [Saccharomyces cerevisiae]	64	44	367
4009	1	81	368	gi139372	grab gene product [Bacillus brevis]	64	41	288
4166	1	2	349	gi1149435	putative [Lactococcus lactis]	64	46	348
4366	1	2	307	gi1216267	ORF2 [Bacillus megaterium]	64	44	306
4457	1	2	400	gi11197667	vitellogenin [Anolis pulchellus]	64	43	399
11	3	1539	2438	gi1438228	ORF C [Staphylococcus aureus]	63	32	900
24	7	5611	5423	gi11369943	a1 gene product [Bacteriophage B1]	63	34	189
29	1	1	390	gi1467441	expressed at the end of exponential growth under conditions in which the enzymes of the TCA cycle are repressed [Bacillus subtilis] gi1467441	63	43	390
					expressed at the end of exponential growth under conditions in which the enzymes of the TCA cycle are repressed [Bacillus subtilis]			
31	6	6329	5712	gi1496943	ORF [Saccharomyces cerevisiae]	63	47	618
44	23	14669	115019	pir1A04446[QDEC	hypothetical protein P-92 - Escherichia coli	63	36	351
48	6	4403	6250	gi143498	pyruvate synthase [Halobacterium halobium]	63	42	1848
50	5	3869	4738	gi1131967	lipa-43d gene product [Bacillus subtilis]	63	43	870
53	6	6764	5742	gi1474176	regulator protein [Staphylococcus xylosous]	63	49	1023

TABLE 2

3. Virus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start	Stop	Match	Accession	Match gene name	% id	% ident	Length (nt)
56	14	15880	117607	gi 467409		DNA polymerase III subunit [Bacillus subtilis]	63	44	1728
57	11	7945	7376	gi 37036		ORF_0158 [Escherichia coli]	63	39	570
62	3	2479	2114	gi 42656		unknown [Rhizobium meliloti]	63	41	366
70	8	6562	7353	gi 339821		PhoC [Rhizobium meliloti]	63	46	792
75	2	223	927	gi 149376		HisG [Lactococcus lactis]	63	45	705
78	5	4912	4403	gi 413950		Ipa-26d gene product [Bacillus subtilis]	63	42	510
91	5	9076	7220	gi 466997		IscH2_82126-CL157 [Mycobacterium leprae]	63	41	1857
91	8	10566	9448	gi 1204344		Cystathionine gamma-synthase [Haemophilus influenzae]	63	45	1119
120	1	21	1508	gi 882657		Sulite reductase (NADPH) flavoprotein beta subunit [Escherichia coli]	63	46	1488
120	4	2722	4125	gi 665994		Hypothetical protein [Bacillus subtilis]	63	34	1404
127	7	6064	7566	gi 40162		murE gene product [Bacillus subtilis]	63	44	1503
149	6	2321	2106	gi 148503		DnaK [Erysipelothrix rhusiopathiae]	63	40	216
149	26	10445	10170	gi 4870		ORF 2, has similarity to DNA polymerase [Saccharomyces kluyveri] r S15961 S15961 hypothetical protein 2 - yeast [Saccharomyces yverli] plasmid pSKL	63	42	276
164	2	507	1298	gi 145476		CDP-diglyceride synthetase [Escherichia coli]	63	44	792
166	6	9009	8164	gi 151932		Fructose enzyme II [Rhizobacter capsulatus]	63	41	1746
169	4	1704	1886	gi 152886		Elongation factor Ts (tsf) [Spiroplasma citri]	63	48	183
188	5	3145	2951	gi 1334547		GIV COI 114 grp 1B protein [Podospora anserina]	63	42	195
195	13	11767	12804	gi 606100		ORF_0335 [Escherichia coli]	63	40	1018
201	2	607	2283	gi 433534		Arginyl-tRNA synthetase [Corynebacterium glutamicum] pIR A5936 A5936 arginine-tRNA ligase (EC 6.1.1.19) - corynebacterium glutamicum	63	46	1677
206	14	15893	16489	gi 580828		N-acetyl-glucamate-gamma-semialdehyde dehydrogenase [Bacillus subtilis]	63	49	597
220	5	7769	5766	gi 216334		SecA protein [Bacillus subtilis]	63	42	2004
221	1	74	907	gi 677945		AppA [Bacillus subtilis]	63	42	834
227	3	944	1708	gi 1510558		Cobvric acid synthase [Methanococcus jannaschii]	63	46	765
261	2	804	1070	gi 486511		ORF YKR054c [Saccharomyces cerevisiae]	63	45	267
269	2	1606	1960	gi 148221		DNA-dependent ATPase, DNA helicase [Escherichia coli] pIR J50137 J50137 recQ protein - Escherichia coli	63	42	1647

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
278	8	7417	6176	gi1099273	cyatathionine gamma-synthase [Mycobacterium leprae] sp146807 METB_MYCUE CYSTATIONINE GAMMA-SYNTASE (EC 4.2.99.9) O-SUCCINYLHOMOSERINE (THIOL)- LYASE	63	41	1242
287	2	738	1733	gi1405133	putative [Bacillus subtilis]	63	38	996
295	1	2	748	gi1239983	hypothetical protein [Bacillus subtilis]	63	41	747
328	3	2148	3134	gi145302	carrier protein (AA 1 - 437) [Pseudomonas aeruginosa] ir[S11497 S11497 branched-chain amino acid tr-:port protein brab - eudomonas aeruginosa	63	36	987
362	2	1226	1216	sp1251136 SERA	D-3-PHOSPHOGLYCERATE DEHYDROGENASE (EC 1.1.1.95) (PGDH)	63	38	411
404	1	326	1053	gi1303816	Yqz2 [Bacillus subtilis]	63	35	726
405	3	2101	1715	gi1303914	Yqny [Bacillus subtilis]	63	42	387
406	3	451	227	gi142152	sulfate permease (gty start codon) [Synechococcus PCC6301] pir A30101 CRYCST sulfate transport protein - Synechococcus sp. PCC 7942	63	43	225
415	2	1048	2718	gi1205402	transport ATP-binding protein [Haemophilus influenzae]	63	41	1671
426	4	3575	2679	gi1393268	29-kilodalton protein [Streptococcus pneumoniae] sp P42362 P29K-STPM 39 MD HEMBRANE PROTEIN IN PSAA 5'REGION ORF1	63	39	897
505	3	1347	2195	gi1418999	orf6 [Lactobacillus sake]	63	40	849
507	1	2	574	gi1546917	comK [Bacillus subtilis, E26, Peptide, 192 aa]	63	35	573
562	2	146	1084	gi143985	nlfs-like gene [Lactobacillus delbrueckii]	63	45	939
675	1	427	215	gi1510994	serine aminotransferase [Methanococcus jannaschii]	63	29	213
686	1	3	230	gi1517356	nitrate reductase (NADH) [Lotus japonicus]	63	52	228
701	1	3	392	gi1881940	NorO protein [Paracoccus denitrificans]	63	41	390
720	1	2	400	gi147168	open reading frame [Streptomyces lividans]	63	35	399
779	1	571	287	gi1261932	unknown [Mycobacterium tuberculosis]	63	41	285
907	1	22	321	gi149445	ORF1 [Lactococcus lactis]	63	27	300
972	1	794	399	gi1511235	M. jannaschii predicted coding region M1232 [Methanococcus jannaschii]	63	27	396
1085	1	1154	618	gi1204277	hypothetical protein (CB-U00019_14) [Haemophilus influenzae]	63	38	537
1094	1	3	542	gi1709943	urea amidolyase [Bacillus subtilis]	63	39	540
1108	1	3	482	pir1549892 S498	regulation protein - Bacillus subtilis	63	44	480
1113	1	1231	617	gi1493017	endocarditis specific antigen [Enterococcus faecalis]	63	45	615

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
1300	1	3	695	sp P3940 YOJH	[HYPOTHETICAL 54.3 NO PROTEIN IN ECO-ALKB INTERGENIC REGION]	63	46	693
1325	1	1	204	gi 928989	[p100 protein (Borrelia burgdorferi)]	63	30	204
1814	1	3	245	gi 1303914	[YohY (Bacillus subtilis)]	63	34	243
2021	1	498	250	pir C33496 C334	[hiac homolog - Bacillus subtilis]	63	46	249
2325	1	2	193	gi 436132	[product is similar to TnpA of transposon Tn554 from Staphylococcus aureus (Clostridium butyricum)]	63	40	192
2335	1	1	195	gi 1184298	[flagellar H5-ring protein (Borrelia burgdorferi)]	63	47	195
2406	1	451	227	gi 1041785	[thoptry protein (Plasmodium yoelii)]	63	33	225
2961	2	136	360	gi 132443	[carbamoyl-phosphate synthase (glutamine-hydrolyzing) (Bacillus albidolyticus)]	63	52	225
2965	1	1	402	gi 140784	[orf-1; novel antigen (Staphylococcus aureus)]	63	50	402
2987	1	583	293	gi 1224069	[amidase (Moraxella catarrhalis)]	63	35	291
2994	1	266	135	gi 836646	[phosphoribosylformimino-praic ketoisomerase (Rhodobacter phaeoideus)]	63	51	132
3043	1	440	252	gi 1480237	[phenylacetaldehyde dehydrogenase (Escherichia coli)]	63	40	189
3078	1	609	400	gi 1487982	[intrinsic membrane protein (Mycoplasma hominis)]	63	36	210
3139	1	2	217	gi 439126	[glutamate synthase (NADPH) (Acetivibrium brasilense)]	63	47	216
					[glutamate synthase (NADPH) (EC 1.4.1.13) - zoospirillum brasiliense]			
3625	1	793	198	gi 623073	[OHF160, initiator (Bacterium (epsilon l4c-III)]	63	48	196
3658	1	1	399	gi 1303697	[Yrka (Bacillus subtilis)]	63	37	399
3659	1	3	395	gi 1256135	[Ydbf (Bacillus subtilis)]	63	48	393
3783	1	720	361	gi 1256902	[Pyruvate decarboxylase isozyme 2 (Swiss Prot. accession number P16467) (Saccharomyces cerevisiae)]	63	36	360
3900	1	338	171	gi 10537 AMYB	[BETA-AMYLASE (EC 3.2.1.2) (1,4-ALPHA-D-GLUCAN MALTOHYDROLASE)]	63	54	168
4309	1	3	176	gi 137967 A379	[neural cell adhesion molecule Ng-CAM precursor - chicken]	63	57	174
4367	1	1	195	gi 1121932	[per6p gene product (Pichia pastoris)]	63	30	195
4432	1	1	312	gi 151259	[HMG-CoA reductase (EC 1.1.1.88) (Pseudomonas mevalonii)]	63	51	312
					[hydroxymethylglutaryl-CoA reductase (EC 1.1.1.88) Pseudomonas sp.]			
4468	1	6	308	gi 1296464	[ATPase (Lactococcus lactis)]	63	36	303
33	3	1411	2400	gi 1515675	[tagatase 6-P kinase (Streptococcus mutans)]	62	44	990
36	9	5985	6218	gi 1490521	[HMSH] (Homo sapiens)]	62	51	234

TABLE 2

5. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	V sim	V ident	Length (nt)
37	1	2	721	gi1107531	iceU gene product (Campylobacter coli)	62	33	720
38	15	110912	11569	gi1222058	H. influenzae predicted coding region HIN1279. [Haemophilus influenzae]	62	38	678
38	25	119526	120329	gi1695280	ORP2 (Alcaligenes eutrophus)	62	41	804
37	2	2523	1780	gi1171234	orf1 [Haemophilus influenzae]	62	55	744
37	9	6646	6350	gi1508174	EF1B domain of PTS-dependent Gat transport and phosphorylation Escherichia coli	62	35	297
38	1	2	559	gi1755152	highly hydrophobic integral membrane protein [Bacillus subtilis] sp P43953 TAGC_BACSU TEICHOIC ACID TRANSLOCATION PERMEASE PROTEIN AGC.	62	34	558
67	10	8250	9014	gi1470683	Shows similarity with ATP-binding proteins from other ABC-transport porons. Swiss Prot Accession Numbers P24137, P08007, P04285, P24136 Escherichia coli	62	31	765
69	8	8315	7494	gi146816	actA 4 gene product [Streptomyces coelicolor]	62	44	822
80	3	1793	1320	gi13993	UDP-N-acetylmutamylalanine-D-glutamate ligase [Bacillus subtilis]	62	43	474
87	7	7034	9205	gi1217191	5'-nucleotidase precursor [Vibrio parahaemolyticus]	62	48	2172
100	3	4051	3089	gi1511047	phosphoglycerate dehydrogenase [Methanococcus jannaschii]	62	42	963
102	1	2	520	gi153655	mismatch repair protein [Streptococcus pneumoniae] pif[C28667]C28667 DNA mismatch repair protein hexa - Streptococcus pneumoniae	62	34	519
112	2	466	1068	gi1153741	ATP-binding protein [Streptococcus mutans]	62	37	603
114	7	6855	7562	gi11204866	L-fucose operon activator [Haemophilus influenzae]	62	38	708
116	4	6823	5633	gi1677947	AppC [Bacillus subtilis]	62	37	1191
124	8	6855	6004	gi1853777	product similar to E. coli PRA2 protein [Bacillus subtilis] pif[S55438]S55438 ynfK protein - Bacillus subtilis sp P45473 HEMK_BACSU POSSIBLE PHOTOPHYRINOGEN OXIDASE (EC 3.3.-)	62	44	852
148	1	24	554	gi1467456	unknown [Bacillus subtilis]	62	30	531
149	20	7591	6725	gi1205807	replicative DNA helicase [Haemophilus influenzae]	62	41	867
163	3	1903	1153	gi140067	X gene product [Bacillus sphaericus]	62	42	351
164	15	114673	115632	gi142219	P35 gene product (AA 1 - 314) [Escherichia coli]	62	38	960
165	2	1166	1447	gi1403936	phenylalanyl-tRNA synthetase alpha subunit (Gly294 variant) unidentified cloning vector	62	38	282
166	2	2084	5089	gi1308861	CTC start codon [Lactococcus lactis]	62	44	3006
171	1	1225	614	gi11046053	hypothetical protein (SP:P20249) [Mycoplasma genitalium]	62	41	612

TABLE 2

5. aureus - putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
183	1	3521	1310	gi 143045	henY [Bacillus subtilis]	62	45	1212
200	1	3	956	gi 142439	ATP-dependent nuclease [Bacillus subtilis]	62	32	954
237	2	935	1966	gi 141695	hisC protein [Escherichia coli]	62	44	1032
261	3	4008	2605	gi 143121	ORF A1 putative [Bacillus firmus]	62	42	1404
299	8	4477	4719	gi 467441	expressed at the end of exponential growth under conditions in which the enzymes of the TCA cycle are repressed [Bacillus subtilis] gi 467441	62	47	243
					expressed at the end of exponential growth under conditions in which the enzymes of the TCA cycle are repressed Bacil			
304	6	5018	3819	gi 153015	FenA protein [Staphylococcus aureus]	62	43	1200
324	1	2	262	gi 142717	Cytochrome aa3 controlling protein [Bacillus subtilis] pir[A13960]A13960	62	30	261
					cta protein - Bacillus subtilis sp P12946 CTAA_BACSU CYTOCHROME AA3 CONTROLLING PROTEIN			
325	2	249	1207	gi 581088	methionyl-tRNA formyltransferase [Escherichia coli]	62	39	939
332	6	4894	4631	gi 1499960	uridine 5'-monophosphate synthase [Methanococcus jannaschii]	62	36	264
355	1	2	370	gi 145925	fecB [Escherichia coli]	62	32	369
365	8	6628	6804	gi 413943	ipa-19d gene product [Bacillus subtilis]	62	54	177
369	2	2744	1626	pir[A1357]A135	regulatory protein pfor - Clostridium perfringens	62	42	1119
370	1	34	264	gi 40665	holo-glucosylase [Clostridium thermocellum]	62	37	231
415	3	2709	3176	gi 1205401	transport ATP-binding protein [Haemophilus influenzae]	62	35	468
429	1	1578	790	gi 1046024	[Na ⁺ ATPase subunit J [Mycoplasma genitalium]	62	40	789
444	2	704	1369	gi 581510	modulation gene; integral membrane protein; homology to Rhizobium equimans node [Rhizobium loti]	62	37	666
477	2	751	1869	pir[A18440]A184	ring-infected erythrocyte surface antigen 2, RESA-2 - Plasmodium falciparum	62	44	1119
485	1	241	1707	gi 117934	betaine aldehyde dehydrogenase [Beta vulgaris]	62	43	1467
487	3	1141	1311	gi 149445	ORF1 [Lactococcus lactis]	62	31	171
494	2	1134	1313	gi 166835	ribulose biphosphate carboxylase/oxygenase activase [Arabidopsis thaliana]	62	37	180
518	1	193	882	gi 153491	O-methyltransferase [Streptomyces glaucescens]	62	39	690
534	2	369	2522	gi 1480429	putative transcriptional regulator [Bacillus stearothermophilus]	62	35	2154
551	6	4371	4820	gi 511113	ferric uptake regulation protein [Campylobacter jejuni]	62	17	450
574	1	1	570	gi 153600	enterotoxin B [Staphylococcus aureus]	62	43	570

TABLE 2

S. aureus - putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
590	2	344	1171	gi 40367	[ORF1] Clostridium acetobutylicum	62	37	838
655	1	396	830	gi 147195	[pnb] protein [Escherichia coli]	62	44	435
656	1	2	478	gi 1205451	[cell division inhibitor [Haemophilus influenzae]	62	36	477
676	1	692	348	gi 1511613	[methyl coenzyme M reductase system, component A2 [Methanococcus jannaschii]	62	36	345
687	1	493	248	gi 49272	[Asparaginase [Bacillus licheniformis]	62	46	246
700	2	267	944	gi 1205822	[hypothetical protein (GB:X75627.4) [Haemophilus influenzae]	62	40	678
840	2	1715	1041	gi 1045865	[M. genitalium predicted coding region MG181 [Mycoplasma genitalium]	62	36	675
864	4	898	1491	gi 1144332	[deoxyuridine nucleotidohydrolase [Homo sapiens]	62	38	594
916	1	35	400	gi 413931	[ipa-7d gene product [Bacillus subtilis]	62	45	366
1071	1	1	771	gi 1510649	[aspartokinase 1 [Methanococcus jannaschii]	62	40	771
1084	1	19	609	gi 688011	[ApX-1 antigen [human, infertile patient, testis, peptide, 505 aa]	62	39	591
1103	1	3	203	gi 581261	[ORF homologous to E. coli mcrA [Hermosiphon aurantiacus] p1r S14030 S14030	62	51	201
					[hypothetical protein - Hermosiphon aurantiacus, fragment]			
1217	1	463	233	gi 460025	[ORF2, putative [Streptococcus pneumoniae]	62	41	231
1533	1	644	414	gi 413968	[ipa-44d gene product [Bacillus subtilis]	62	48	211
1537	1	3	257	gi 1510641	[alanine-CRNA synthetase [Methanococcus jannaschii]	62	23	255
2287	1	3	161	gi 485936	[mipC gene product [Proteus mirabilis]	62	45	159
2386	1	3	245	gi 285708	[nontoxic component [Clostridium botulinum]	62	31	243
2484	1	331	167	gi 142092	[DNA-repair protein (recA) [Anabaena variabilis]	62	35	165
2490	1	798	400	gi 581648	[epia gene product [Staphylococcus epidermidis]	62	42	399
3016	1	596	300	gi 710032	[uroperiplinogen III [Bacillus subtilis]	62	51	297
3116	1	1	213	gi 466883	[nifS; B1496_C2_193 [Mycobacterium leprae]	62	44	213
3297	1	823	413	gi 475715	[acetyl coenzyme A acetyltransferase (thiolase) [Clostridium acetobutylicum]	62	42	411
3609	1	31	276	gi 1408501	[homologous to N-acyl-L-amino acid amidohydrolase of Bacillus	62	48	246
					[stearothermophilus [Bacillus subtilis]			
3665	2	584	402	gi 151259	[HMG-CoA reductase (EC 1.1.1.88) [Pseudomonas mevalonii] p1r A44756 A44756	62	40	183
					[hydroxymethylglutaryl-CoA reductase (EC 1.1.1.88) Pseudomonas sp.			
3733	1	3	374	gi 1353197	[thioredoxin reductase [Eubacterium acidaminophilum]	62	42	372

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
3898	1	1	237	gi153675	tagatose 6-P kinase [Streptococcus mutans]	62	45	237
4027	1	283	143	gi1330705	homologue to gene 30 (aa 1-59); putative [Bovine herpesvirus 4]	62	43	141
4109	1	727	365	gi141748	hsdM protein (AA 1-520) [Escherichia coli]	62	45	363
4303	1	1	303	gi1330813	YqeM [Bacillus subtilis]	62	43	303
4380	1	530	267	gi1235684	inevlonate pyrophosphate decarboxylase [Saccharomyces cerevisiae]	62	55	264
4494	1	2	256	gi1510692	enterotoxin H [Staphylococcus aureus]	62	34	255
4598	1	411	223	gi1763513	ORF4; putative [Streptomyces violaceoruber]	62	45	189
4624	1	1	222	gi141748	hsdM protein (AA 1-520) [Escherichia coli]	62	45	222
5	5	4288	3912	gi1928831	ORF95; putative [Lactococcus lactis phage BK5-7]	61	36	357
11	1	320	162	gi133356[C33]	prothymosin alpha homolog (clone 32) - human (fragment)	61	33	159
16	11	10791	11938	gi1205391	hypothetical protein (SP-P3395) [Haemophilus influenzae]	61	44	948
32	1	281	801	gi1046504	exo-beta 1,3 glucanase [Cochliobolus carbonum]	61	50	519
38	3	616	1107	gi1510864	glutamine transport ATP-binding protein Q [Methanococcus jannaschii]	61	41	492
45	4	3082	4038	gi1109686	ProX [Bacillus subtilis]	61	45	957
48	8	7118	7504	gi1498839	ORF2 [Clostridium perfringens]	61	33	387
51	9	4605	5570	gi1388269	trac [Plasmid pAD1]	61	42	966
60	6	1689	2243	gi1205893	hypothetical protein (GB-U00011_3) [Haemophilus influenzae]	61	32	555
62	9	5559	5122	gi1854656	Na/H antiporter system ORF2 [Bacillus alcalophilus]	61	38	438
67	5	4330	5646	gi1466612	nika [Escherichia coli]	61	36	1317
74	2	2400	1504	gi1204846	carbamate kinase [Haemophilus influenzae]	61	40	897
85	3	3198	1101	gi1498756	amidophosphoribosyltransferase PurF [Rhizobium etli]	61	41	1098
86	4	1995	1582	gi1499931	M. jannaschii predicted coding region MJ1083 [Methanococcus jannaschii]	61	44	414
97	1	74	649	gi1518679	orf [Bacillus subtilis]	61	44	576
99	2	2656	1990	gi1413958	[ipa-34d gene product [Bacillus subtilis]	61	18	465
124	7	6223	5123	gi1556881	Similar to Saccharomyces cerevisiae SUP5 protein [Bacillus subtilis] pif184938/84938 4c-2nd protein - Bacillus subtilis sp19153/MLC_BACSU HYPOTHETICAL 37.0 KD PROTEIN IN SP01R-GLYC INTERGENIC REGION	61	46	1101
125	4	1668	2531	gi1491643	ORF4 gene product [Chloroflexus aurantiacus]	61	43	864

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	A sim	% Ident	Length (nt)
132	1	1250	627	gi P00259 P002	hypothetical protein 1 - Enterococcus faecalis plasmid pAM-beta-1 (fragment)	61	43	624
149	9	3617	3075	gi 1144332	deoxyuridine nucleotidohydrolase [Homo sapiens]	61	40	543
149	22	8690	7869	gi 160047	p101/acidic basic repeat antigen [Plasmodium falciparum] p1r[A29232][A29232] 101K malaria antigen precursor - Plasmodium falciparum (strain Camp)	61	35	822
168	3	1915	2361	gi 1499694	HIT protein, member of the HIT-family [Methanococcus jannaschii]	61	41	447
171	9	9675	7948	gi 467416	similar to SpoVB [Bacillus subtilis]	61	38	1728
174	3	1042	2340	gi 216374	glucaryl 7-ACA acylase precursor [Bacillus laterosporus]	61	49	1299
190	4	5034	4111	gi 409286	bmrU [Bacillus subtilis]	61	37	924
216	1	2	190	gi 415861	eukaryotic initiation factor 2 beta (eIF-2 beta) [Oryctolagus unicolor]	61	29	189
227	7	4161	5048	gi 216341	ORF for methionine amino peptidase [Bacillus subtilis]	61	41	888
238	4	1959	3047	gi 409543	CbrC protein [Erwinia chrysanthemi]	61	38	1089
247	1	2	694	gi 337231	ORF-1579 [Escherichia coli]	61	38	693
247	2	678	1034	gi 142226	chvD protein [Agrobacterium tumefaciens]	61	40	357
257	2	3523	2627	gi 699379	glvr-1 protein [Mycobacterium leprae]	61	40	897
268	2	3419	3051	gi 40364	ORF1 [Clostridium acetobutylicum]	61	41	369
275	4	4621	4827	gi 1204848	hypothetical protein [GP:H07049_57] [Haemophilus influenzae]	61	36	207
277	1	1	1845	gi 784897	beta-N-acetylhexosaminidase [Streptococcus pneumoniae] p1r[A56390][A56390] mannose-6-phosphate 6-epimerase precursor - Streptococcus pneumoniae	61	45	1845
278	9	8003	7032	gi 467462	cysteine synthetase A [Bacillus subtilis]	61	43	972
278	10	9878	8535	gi 1205919	Na ⁺ and Cl ⁻ dependent gamma-aminobutyric acid transporter [Haemophilus influenzae]	61	38	1344
283	1	1	366	gi 755607	polyA polymerase [Bacillus subtilis]	61	36	366
288	2	1918	1496	gi 388108	cell wall enzyme [Enterococcus faecalis]	61	43	423
291	1	86	334	gi 454265	FBP3 [Petunia hybrida]	61	38	249
318	1	1104	694	gi 290531	similar to beta-glucoside transport protein [Escherichia coli] sp P31451 PTB_ECOLI PTS SYSTEM, ARBUTIN-LIKE IIB COMPONENT PHOSPHOTRANSFERASE ENZYME II, B COMPONENT (EC 2.7.1.69)	61	47	411
330	2	1912	1190	gi 1001805	hypothetical protein [Synachocystis sp.]	61	41	723

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
385	2	1513	1025	gi 533098	DnaD protein [Bacillus subtilis]	61	42	489
426	1	794	399	gi 1303853	TogP [Bacillus subtilis]	61	44	396
438	3	810	1421	gi 1293660	AbsA2 [Streptomyces coelicolor]	61	36	612
454	1	1580	792	gi 733522	phosphatidylinositol-4,5-diphosphate 3-kinase [Dictyostellium discoideum]	61	30	789
464	2	784	560	gi 1123120	CSJ87.5 gene product [Caenorhabditis elegans]	61	38	225
470	8	6077	7357	gi 623073	ORF360; putative [Bacteriophage LL-M]	61	47	1281
508	1	554	279	gi 467484	unknown [Bacillus subtilis]	61	45	276
555	3	1916	1296	gi 141800	anthranilate synthase glutamine amidotransferase [Acinetobacter alcoaceticus]	61	42	621
569	1	1711	857	gi 467090	R2235_C2.195 [Mycobacterium leprae]	61	47	855
585	2	961	803	ep P36686 SURE	SURVIVAL PROTEIN SURE HOMOLOG (FRAGMENT)	61	33	159
592	3	1694	1422	gi 1221602	immunity repressor protein [Haemophilus influenzae]	61	32	273
603	1	43	357	gi 507738	Imp [Vibrio parahaemolyticus]	61	33	315
669	1	2467	1235	gi 1146243	22.4% identity with Escherichia coli DNA-damage inducible protein ... putative [Bacillus subtilis]	61	37	1233
675	3	805	1101	gi 403373	glycerophosphoryl diester phosphodiesterase [Bacillus subtilis] p1r 537251 537251 glycerophosphoryl diester phosphodiesterase - acillus subtilis	61	36	297
703	1	1656	829	gi 537181	ORF_470 [Escherichia coli]	61	32	828
728	1	1628	816	gi 806281	DNA polymerase I [Bacillus stearothermophilus]	61	39	813
821	1	61	318	gi 709992	hypothetical protein [Bacillus subtilis]	61	38	258
856	2	2313	1567	gi 609310	portal protein gp3 [Bacteriophage HK97]	61	40	747
923	1	1081	542	gi 143213	putative [Bacillus subtilis]	61	38	540
1124	1	59	370	gi 1107541	C3J09.8 [Caenorhabditis elegans]	61	26	312
1492	1	548	276	gi 406397	unknown [Mycoplasma genitalium]	61	32	273
1602	1	46	318	gi 733522	phosphatidylinositol-4,5-diphosphate 3-kinase [dictyostellium discoideum]	61	34	273
2500	1	577	290	gi 1045964	hypothetical protein (CB:U14001_291) [Mycoplasma genitalium]	61	31	288
2968	1	2	808	gi 397526	clumping factor [Staphylococcus aureus]	61	55	807
3076	1	3	246	gi 149373	ORF 1 [Lactococcus lactis]	61	41	246

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
3609	2	207	401	gi 1408501	homologous to N-acetyl-L-amino acid amidohydrolase of <i>Bacillus stearothermophilus</i> [Bacillus subtilis]	61	39	195
3662	1	1477	740	gi 1303813	Yqgw [Bacillus subtilis]	61	42	738
3672	1	2	442	gi 784897	beta-N-acetylhexosaminidase (Streptococcus pneumoniae) pir[A56390]A56390 mannosyl-glycoprotein ndo-beta-N-acetylglucosaminidase (EC 3.2.1.96) precursor - streptococcus pneumoniae	61	50	441
3724	1	2	220	gi 1009366	Respiratory nitrate reductase [Bacillus subtilis]	61	41	219
3728	1	3	398	gi 677943	AppD [Bacillus subtilis]	61	46	396
3884	1	3	401	gi 784897	beta-N-acetylhexosaminidase (Streptococcus pneumoniae) pir[A56390]A56390 mannosyl-glycoprotein ndo-beta-N-acetylglucosaminidase (EC 3.2.1.96) precursor - streptococcus pneumoniae	61	47	399
3971	1	3	381	gi 784897	beta-N-acetylhexosaminidase (Streptococcus pneumoniae) pir[A56390]A56390 mannosyl-glycoprotein ndo-beta-N-acetylglucosaminidase (EC 3.2.1.96) precursor - streptococcus pneumoniae	61	45	381
4018	1	661	359	gi 1339970	large subunit of NAM-dependent glucanase synthase [Plectonema boryanum]	61	24	303
4041	1	546	274	gi 413953	lin-28d gene product [Bacillus subtilis]	61	48	273
4047	1	1	402	gi 528991	unknown [Bacillus subtilis]	61	42	402
4102	1	1	345	gi 976025	HrsA [Escherichia coli]	61	46	345
4155	1	1	336	gi 784897	beta-N-acetylhexosaminidase (Streptococcus pneumoniae) pir[A56390]A56390 mannosyl-glycoprotein ndo-beta-N-acetylglucosaminidase (EC 3.2.1.96) precursor - streptococcus pneumoniae	61	50	336
4268	1	463	233	gi 450688	hadH gene of Ecoprr1 gene product [Escherichia coli] pir[S38437]S38437 hsdM protein - Escherichia coli pir[S09629]S09629 hypothetical protein X - Escherichia coli (S09 40-520)	61	38	231
4374	1	542	273	gi 784897	beta-N-acetylhexosaminidase (Streptococcus pneumoniae) pir[A56390]A56390 mannosyl-glycoprotein ndo-beta-N-acetylglucosaminidase (EC 3.2.1.96) precursor - streptococcus pneumoniae	61	50	270
4389	1	2	172	gi 147516	ribokinase [Escherichia coli]	61	35	171
4621	1	2	268	gi 784897	beta-N-acetylhexosaminidase (Streptococcus pneumoniae) pir[A56390]A56390 mannosyl-glycoprotein ndo-beta-N-acetylglucosaminidase (EC 3.2.1.96) precursor - streptococcus pneumoniae	61	47	267
4663	1	27	227	gi 976025	HrsA [Escherichia coli]	61	50	201
4	6	4663	5536	gi 1408501	homologous to N-acetyl-L-amino acid amidohydrolase of <i>Bacillus stearothermophilus</i> [Bacillus subtilis]	60	43	1128

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match name	% sim	% ident	Length (nt)
11	6	3426	3725	gi 410748	ring-infected erythrocyte surface antigen (Plasmodium falciparum) pifA25526 A25526 ring-infected erythrocyte surface antigen recursor - Plasmodium falciparum (strain FC27/Papua New Guinea) sp P13830 RESA_PLAFF RING-INFECTED ERYTHROCYTE SURFACE ANTIGEN RE	60	24	300
11	14	11035	10113	gi 1217651	carbonyl reductase (NADPH) (Rattus norvegicus)	60	28	723
16	12	11917	12930	gi 1001453	hypothetical protein (Synchocystis sp.)	60	37	1014
33	1	56	469	gi 388109	regulatory protein (Enterococcus faecalis)	60	41	444
37	13	10414	9834	gi 1136656	Orf1 (Bacillus subtilis)	60	40	981
39	4	4364	4522	gi 14872	ORF 4 (Saccharomyces kluyveri)	60	47	159
41	1	2047	1025	gi 142822	D-alanine racemase cds (Bacillus subtilis)	60	39	1023
43	4	2474	3607	gi 468046	para-nitrobenzyl esterase (Bacillus subtilis)	60	40	1136
44	10	6756	7769	gi 414234	thf (Escherichia coli)	60	52	1016
45	10	8874	9074	gi 343949	var1 (40.0) (Saccharomyces cerevisiae)	60	44	201
56	18	37842	26430	gi 468764	leucR gene product (Rhizobium meliloti)	60	35	1413
60	2	173	388	gi 1303864	YqgQ (Bacillus subtilis)	60	33	216
61	2	357	1619	gi 467124	ureD: 8229_C3_234 (Mycobacterium leprae)	60	43	1263
65	1	787	395	gi 1518853	Oefa (Salmonella typhimurium)	60	36	193
88	1	1	1188	gi 1480429	putative transcriptional regulator (Bacillus stearothermophilus)	60	30	1188
92	6	4735	3881	gi 349227	transmembrane protein (Escherichia coli)	60	37	855
92	7	5996	4923	gi 466613	nlkB (Escherichia coli)	60	38	1074
93	1	949	476	gi 1510925	coenzyme F420-reducing hydrogenase, beta subunit (Methanococcus jannaschii)	60	27	474
96	6	7166	7178	gi 472715	acrossomy protein (Mycobacterium piscicidalis)	60	30	213
98	6	3212	4069	gi 467425	unknown (Bacillus subtilis)	60	42	858
102	10	7158	7430	gi 143092	acetolactate synthase small subunit (Bacillus subtilis) sp P37252 ILVW_BACSU ACETOLACTATE SYNTHASE SMALL SUBUNIT (EC 1.1.1.18) (NAD) (ACETOHYDROXY-ACID SYNTHASE SMALL SUBUNIT) (ALS)	60	37	273
109	11	9127	10515	gi 1252529	D-succinylbenzoic acid (DSB) CoA ligase (Staphylococcus aureus)	60	28	1389
109	12	10499	11656	gi 141954	beta-ketothiolase (Alcaligenes eutrophus)	60	41	1158
119	2	4630	3134	gi 1524280	unknown (Mycobacterium tuberculosis)	60	45	1497

TABLE 2

5. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
121	9	6957	7646	gi1107329	leuC gene product [Campylobacter coli]	60	35	690
140	7	7704	8013	gi1146547	kdpA [Escherichia coli]	60	45	1692
145	1	2	703	gi11460077	unknown [Mycobacterium tuberculosis]	60	23	702
150	3	2809	2216	gi11146230	putative [Bacillus subtilis]	60	40	594
157	2	1389	961	gi11303975	[VqjX [Bacillus subtilis]	60	30	429
158	5	5125	4769	gi11449288	unknown [Mycobacterium tuberculosis]	60	36	357
159	1	511	257	gi1580932	murD gene product [Bacillus subtilis]	60	43	255
160	1	159	1187	gi11204532	hypothetical protein (GB:L19201_29) [Haemophilus influenzae]	60	34	1029
161	14	8249	7866	gi11496003	ORF3: PepX; putative oligonucleotide phosphatase based on homology with Lactococcus lactis PepX (GenBank Accession Number 232522) [Caldicellulosiruptor saccharolyticus]	60	34	384
172	3	1331	2110	gi1485280	28.2 kDa protein [Streptococcus pneumoniae]	60	33	780
173	2	4082	2460	gi11524397	glycine betaine transporter Opud [Bacillus subtilis]	60	41	1623
173	4	5163	4933	gi11100737	NAUP dependent leukotoxin bc 12-hydroxydehydrogenase [Sus scrofa]	60	44	1011
198	3	3	995	gi1413943	[Ips-19d gene product [Bacillus subtilis]	60	42	993
201	4	3641	4573	gi137028[VADP_	HYPOTHETICAL 29.4 KD PROTEIN IN HENL-PPS INTERGENIC REGION PRECURSOR.	60	37	933
203	3	3269	2415	gi1527798	[P9719_34p; CAI: 0.14 [Saccharomyces cerevisiae]	60	43	855
206	9	12214	12515	gi137347[YECD_	HYPOTHETICAL 21.8 KD PROTEIN IN ASP5 5'-REGION.	60	47	282
212	4	1213	1410	gi1332711	hemagglutinin-neuraminidase fusion protein [Human parainfluenza virus 3]	60	34	198
214	1	65	1153	gi11204366	hypothetical protein (GB:U14003_130) [Haemophilus influenzae]	60	36	1089
237	1	2	937	gi11493377	[HisD [Lactococcus lactis]	60	40	936
241	6	5696	4998	gi11046160	hypothetical protein (GB:U00021_5) [Mycoplasma genitalium]	60	37	699
260	6	5919	6485	gi1431950	similar to B. subtilis gene (GB: BACHENIV_5) [Clostridium acetabulum]	60	35	567
264	3	2432	1218	gi1397526	clumping factor [Staphylococcus aureus]	60	53	1215
267	1	3	1409	gi1148316	NAH-antiporter protein [Enterococcus hirae]	60	27	1407
275	3	3804	4595	gi135889[P368	leuD 3'-region hypothetical protein - Lactococcus lactis subsp. lactis [strain IL1403]	60	35	792
291	3	860	1198	gi11208889	coded for by C. elegans cDNA yk130e12.5; contains C2H2-type zinc fingers [Caenorhabditis elegans]	60	33	339

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
307	6	3421	3176	gi11070014	protein-dependent (Bacillus subtilis)	60	36	246
316	8	4957	5823	gi1413952	lipa-28d gene product (Bacillus subtilis)	60	41	867
328	4	2996	3484	gi11204484	membrane-associated component, branched amino acid transport system (Haemophilus influenzae)	60	39	489
332	5	4887	4363	gi11205449	colicin V production protein (pur regulon) (Haemophilus influenzae)	60	37	525
357	1	1062	532	gi1487842	single-stranded DNA-specific exonuclease (Escherichia coli)	60	41	531
375	2	96	362	gi11057	adenylyl cyclase gene product (Saccharomyces kluyveri) - [J01145] (OVBK)	60	47	267
					adenylyl cyclase (EC 4.6.1.1) - yeast (Saccharomyces kluyveri)			
397	1	66	416	gi1709999	glucuronate dehydratase (Bacillus subtilis)	60	37	351
409	1	2	163	gi1499700	glycogen phosphorylase (Saccharomyces cerevisiae)	60	35	162
453	4	914	1237	gi1196899	unknown protein (Staphylococcus aureus)	60	36	324
453	7	3838	3620	ep12222 VCF1	HYPOPHOSPHATE 226 KD PROTEIN (ORF 1901)	60	31	219
470	2	622	945	gi130782 S307	integrin homolog - yeast (Saccharomyces cerevisiae)	60	31	324
500	1	118	606	gi1467407	unknown (Bacillus subtilis)	60	36	489
503	3	752	982	gi1167835	myosin heavy chain (Dictyostelium discoideum)	60	34	231
505	4	2238	3563	gi11510732	NADH oxidase (Methanococcus jannaschii)	60	26	1326
523	1	3	1043	gi1143331	alkaline phosphatase regulatory protein (Bacillus subtilis)	60	41	1041
					phr A27650 A27650 regulatory protein phoR - Bacillus subtilis			
					phr P23545 PHOR_BACSU ALKALINE PHOSPHATASE SYNTHESIS SENSOR PROTEIN INOR (EC 2.7.3.-)			
543	1	1	465	gi11511103	cobalt transport ATP-binding protein O (Methanococcus jannaschii)	60	40	465
545	1	1	726	gi11498192	putative (Pseudomonas aeruginosa)	60	40	726
556	1	2	1054	gi11477402	lex gene product (Bordetella pertussis)	60	42	1053
578	1	974	489	gi11205129	H. influenzae predicted coding region H10882 (Haemophilus influenzae)	60	42	486
594	1	1	624	gi11212755	adenylyl cyclase (Aeromonas hydrophila)	60	35	624
604	1	3	530	gi1145925	fecB (Escherichia coli)	60	42	528
620	1	926	465	gi11205483	bicyclic resistance protein (Haemophilus influenzae)	60	33	462
630	2	871	1122	gi11486242	unknown (Bacillus subtilis)	60	41	252
645	2	574	425	gi11205136	serine hydroxymethyltransferase (serine methylase) (Haemophilus influenzae)	60	28	150

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% Ident	length (nt)
684	1	1082	843	gi11205538	hypothetical protein (GB:U14003.302) [Haemophilus influenzae]	60	39	240
786	1	967	485	gi11402944	orfRM1 gene product [Bacillus subtilis]	60	46	483
844	1	588	346	gi1790943	urea amidolyase [Bacillus subtilis]	60	40	243
851	1	1	726	gi1159661	GMP reductase [Ascaris lumbricoides]	60	41	726
871	1	1746	874	gi11001493	hypothetical protein [Synecocystis sp.]	60	39	873
896	1	1558	839	gi1604926	NADH dehydrogenase, subunit 5 [Schizosaccharomyces pombe] sp P50368 NDSH_SCHPO	60	39	720
908	2	448	753	gi1662880	novel hemolytic factor [Bacillus cereus]	60	31	306
979	1	2	595	gi11429255	putative: orf1 [Bacillus subtilis]	60	30	594
1078	1	669	502	gi1581055	inner membrane copper tolerance protein [Escherichia coli] gi1871029 disulphide isomerase like protein [Escherichia coli] pir184795184795 inner membrane copper tolerance protein - Escherichia coli	60	40	168
1112	1	1150	620	gi1407885	ORF3 [Streptomyces griseus]	60	34	531
1135	1	484	275	gi1171407	Vps8p [Saccharomyces cerevisiae]	60	36	210
1146	1	17	562	gi1239981	hypothetical protein [Bacillus subtilis]	60	36	546
1291	1	716	360	pir155753015575	carboxyl esterase - Acinetobacter calcoaceticus	60	30	357
1332	1	336	169	gi1222056	aminotransferase [Haemophilus influenzae]	60	44	168
1429	1	13	146	gi1205619	ferritin like protein [Haemophilus influenzae]	60	39	144
1722	1	570	266	gi1240052	[dihydroflavonol-4-reductase, DFR [Hordeum vulgare] barley, cv. Gula, epitide, 354 aa]	60	36	285
2350	1	385	200	gi1497626	ORF 1 [Plasmid pA01]	60	20	186
2396	1	519	310	gi1508981	prephenate dehydratase [Bacillus subtilis]	60	48	210
3027	1	568	302	gi11146199	putative [Bacillus subtilis]	60	37	287
3084	1	20	208	gi11407784	orf-1; novel antigen [Staphylococcus aureus]	60	51	189
3155	1	2	226	gi11046097	cytadherence-accessory protein [Neisseria meningitidis]	60	34	225
3603	1	368	186	gi1510108	mitochondrial long-chain enoyl-CoA hydratase/3-hydroxyacyl-CoA dehydrogenase alpha-subunit [Rattus norvegicus]	60	42	183
3665	1	486	244	gi1151259	HMG-CoA reductase (EC 1.1.1.88) [Pseudomonas mvaloni] pir144756144756 hydroxymethylglutaryl-CoA reductase (EC 1.1.1.88) Pseudomonas sp.	60	42	243
3747	1	3	146	gi1474192	lucC gene product [Escherichia coli]	60	36	144

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
3912	1	3	335	gi 488695	novel antigen: orf-2 (Staphylococcus aureus)	60	44	333
4072	1	3	272	gi 405879	yleH (Escherichia coli)	60	33	270
4134	1	510	352	gi 780656	chemoreceptor protein [Rhizobium leguminosarum bv. viciae] gi 780656 chemoreceptor protein [Rhizobium leguminosarum bv. iciae]	60	28	159
4207	2	677	402	gi 602031	similar to trimethylamine DH [Mycoplasma capricolum] pir S49950 S49950 probable trimethylamine dehydrogenase (EC 5.99.7) - Mycoplasma capricolum (SGC3) (fragment)	60	41	276
4243	1	127	324	gi 899317	peptide synthetase module [Microcystis aeruginosa] pir S49111 S49111 probable amino acid activating domain - Microcystis aeruginosa (fragment) (SUB 144-528)	60	42	198
4310	1	624	313	gi 308980	phoB [Bacillus subtilis]	60	28	312
4345	1	343	173	gi 510108	mitochondrial long-chain enoyl-CoA hydratase/3-hydroxyacyl-CoA dehydrogenase alpha-subunit [Rattus norvegicus]	60	42	171
4382	1	498	280	gi 47382	acyl-CoA dehydrogenase [Streptomyces purpurascens]	60	48	219
4474	1	53	223	gi 510108	mitochondrial long-chain enoyl-CoA hydratase/3-hydroxyacyl-CoA dehydrogenase alpha-subunit [Rattus norvegicus]	60	42	171
23	4	4518	3523	gi 426446	VipB protein [Salmonella typhi]	59	39	996
33	2	707	1483	pi S48604 S486	hypothetical protein - Mycoplasma capricolum (SGC3) (fragment)	59	33	777
33	5	4651	5853	gi 6721	P5982.3 [Caenorhabditis elegans]	59	33	1203
17	2	3228	2299	gi 142833	ORF2 [Bacillus subtilis]	59	37	910
36	21	16784	16593	gi 912576	BIP [Phaeodactylum tricornutum]	59	40	192
52	3	2648	2349	gi 536972	ORF_090a [Escherichia coli]	59	44	300
54	12	14181	13402	gi 483940	transcription regulator [Bacillus subtilis]	59	37	780
57	3	4397	3339	gi 508176	Gat-1-P-DH, MAD dependent [Escherichia coli]	59	40	1059
66	1	986	495	gi 1303901	YqhF [Bacillus subtilis]	59	34	492
67	7	6552	7460	gi 912461	nlc [Escherichia coli]	59	37	909
70	7	5383	6366	gi 1399822	PhoD precursor [Rhizobium meliloti]	59	46	984
78	1	1	1449	gi 971345	unknown, similar to E. coli cardiolipin synthase [Bacillus subtilis] sp P45160 YME_BACSU HYPOHETICAL 58.2 PROTEIN IN MARI-ACDA INTERGENIC REGION.	59	39	1449
82	10	14329	15534	gi 490328	ORF F (unidentified)	59	44	1206

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	Length (nt)
89	2	1602	958	gi1642801	unknown [Saccharomyces cerevisiae]	59	32	645
96	4	4940	5473	gi1333802	protein of unknown function [Rhodospirillum rubrum]	59	33	534
98	1	2	820	gi1467421	similar to B. subtilis DnaM [Bacillus subtilis]	59	34	819
119	1	166	1557	gi1143122	ORF B: putative [Bacillus firmus]	59	36	1392
120	10	6214	6756	gi115354	ORF 55.9 [Bacteriophage T4]	59	39	543
120	16	12476	13510	gi11086575	BetaA [Rhizobium meliloti]	59	44	1035
123	1	386	195	gi1984737	Catalase [Campylobacter jejuni]	59	38	192
130	1	370	645	gi1256634	25-8% identity over 120 aa with the Synenococcus sp. MpeV protein; putative [Bacillus subtilis]	59	31	276
131	4	5278	5712	gi11510655	hypothetical protein (SP-P42297) [Methanococcus jannaschii]	59	39	435
164	1	3	509	gi1001342	hypothetical protein [Synchocystis sp.]	59	41	507
164	4	1329	2821	gi1205165	hypothetical protein (SP-P37764) [Haemophilus influenzae]	59	35	1293
164	19	19643	21376	gi11001381	hypothetical protein [Synchocystis sp.]	59	34	1734
173	3	4727	3717	gi11184121	leucin-induced protein [Vigna radiata]	59	50	1011
179	2	2218	1688	gi1143036	unidentified gene product [Bacillus subtilis]	59	33	531
195	12	12669	11503	gi1762778	Nifs gene product [Anabaena azollae]	59	41	1167
201	5	4702	5670	gi11510240	hemin permease [Methanococcus jannaschii]	59	32	969
201	7	5719	6315	gi11511456	M. jannaschii predicted coding region M1437 [Methanococcus jannaschii]	59	34	597
209	1	102	461	gi1204666	hypothetical protein (GB-X73124.5) [Haemophilus influenzae]	59	42	360
214	3	1050	2234	gi1551531	2-nitropropane dioxygenase [Miliopsis saturnus]	59	36	1185
214	5	3291	4135	gi11303709	YrkJ [Bacillus subtilis]	59	32	843
217	2	3381	2167	gi1290489	tdp (CG Site No. 18430) [Escherichia coli]	59	44	1215
237	5	3078	3785	gi1169182	HLA [Lactococcus lactis]	59	38	708
251	2	376	960	gi1303791	YqjJ [Bacillus subtilis]	59	34	585
266	1	1621	812	gi1146551	transmembrane protein (kdpI) [Escherichia coli]	59	31	810
316	5	4978	3860	gi1405879	YeiH [Escherichia coli]	59	32	1119
370	3	600	761	gi11303794	YqeM [Bacillus subtilis]	59	35	162

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
382	1	1009	506	gi 347513	orf3 [Haemophilus influenzae]	59	34	504
391	3	1620	1273	gi 152901	ORF 3 [Spirochaeta aurantia]	59	37	348
406	3	2805	1705	gi 709992	hypothetical protein [Bacillus subtilis]	59	34	1101
426	5	3802	3245	gi 1204610	iron(III) dicitrate transport ATP-binding protein FECE [Haemophilus influenzae]	59	36	558
429	2	1513	1148	gi 1064809	homologous to sp.NTRA_ECOLI [Bacillus subtilis]	59	42	366
460	2	708	1301	gi 466882	ppal: B1496_C2_189 [Mycobacterium leprae]	59	37	594
461	4	2212	3135	gi 1498295	homoserine kinase homolog [Streptococcus pneumoniae]	59	37	924
473	1	2929	1607	gi 147989	trigger factor [Escherichia coli]	59	40	1323
480	8	5852	6110	gi 1205311	[3R]-hydroxymyristol acyl carrier protein dehydrase [Haemophilus influenzae]	59	40	249
521	1	14	1354	gi 125620 A256	staphylocoagulase - Staphylococcus aureus (fragment)	59	32	1341
534	4	2994	4073	gi 1153746	mannitol-phosphate dehydrogenase [Streptococcus mutans] p1r-[C4798][C4798]	59	36	1080
535	1	1	954	gi 1469939	group B oligopeptidase Pcpa [Streptococcus agalactiae]	59	33	954
551	3	2836	3186	gi 1204511	bacterioferritin comigratory protein [Haemophilus influenzae]	59	45	351
573	2	449	940	gi 386681	ORF YAL022 [Saccharomyces cerevisiae]	59	36	492
650	1	5	748	gi 396400	similar to eukaryotic Na/H+ exchangers [Escherichia coli] sp P12703 VJCE_ECOLI_HYPOTHETICAL 60.5 KD PROTEIN IN SOXK-ACS NTERGENIC REGION [O349]	59	30	744
664	1	566	285	gi 1262748	LukP-PV like component [Staphylococcus aureus]	59	33	282
670	1	3	455	gi 1122758	unknown [Bacillus subtilis]	59	42	453
674	3	543	929	gi 293033	integrase [Bacteriophage phi-LC3]	59	46	387
758	1	349	176	gi 1500472	M. jannaschii predicted coding region M1577 [Methanococcus jannaschii]	59	37	174
771	2	2270	1461	gi 522150	bromoperoxidase BPO-A1 [Streptomyces aureofaciens] ap P13912 BPA1_STRAU NON-HAEM BROMOPEROXIDASE BPO-A1 (EC 1.11.1.-) BROMIDE PEROXIDASE (BPO1), (SUB 2-275)	59	44	810
825	1	2191	1097	gi 397526	clumping factor [Staphylococcus aureus]	59	47	1095
1052	2	1094	723	gi 289262	cone ORF3 [Bacillus subtilis]	59	36	372
1152	1	373	188	gi 1276668	ORF238 gene product [Porphyra purpurea]	59	37	186

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
1198	1	492	247	gi1142439	ATP-dependent nuclease [Bacillus subtilis]	59	26	246
1441	1	468	235	gi11045942	glycyl-tRNA synthetase [Mycoplasma genitalium]	59	37	234
2103	1	1	186	gi1459250	triacylglycerol lipase [Galactomyces geotrichum]	59	33	186
2205	1	793	398	gi11303794	Yqem [Bacillus subtilis]	59	38	396
2578	1	484	284	gi1258003	insulin-like growth factor binding protein complex acid-labile unit [rats, liver, Peptide, 603 aa]	59	48	201
2967	2	145	348	gi11212730	Yqpk [Bacillus subtilis]	59	44	204
3012	1	3	248	gi1173571	neurofilament protein NF70 [Helix asperae]	59	31	246
3544	1	3	401	gi11055218	crotonase [Clostridium acetobutylicum]	59	42	399
3548	1	3	401	gi11055218	crotonase [Clostridium acetobutylicum]	59	42	399
3580	1	698	351	gi11055218	crotonase [Clostridium acetobutylicum]	59	42	348
3720	1	722	363	gi11408494	homologous to penicillin-acylase [Bacillus subtilis]	59	36	360
4171	1	3	296	gi11055218	crotonase [Clostridium acetobutylicum]	59	42	294
4305	1	618	310	gi11524193	unknown [Mycobacterium tuberculosis]	59	35	309
18	1	1242	622	gi1146913	N-acetylglucosamine transport protein [Escherichia coli] pir182895[MQBC2H phosphotransferase system enzyme 1] (EC 7.1.69), N-acetylglucosamine-specific - Escherichia coli ap109323[PTAA_ECOLI PTS SYSTEM, N-ACETYLGLUCOSAMINE-SPECIFIC 11ADC COMPONENT (E1A	58	43	621
20	7	7020	5845	gi1150502	collagen alpha chain precursor (AA -27 to 1127) [Mus musculus]	58	50	1176
21	5	3234	3626	gi11054860	phosphoribosyl anthranilate isomerase [Thermotoga maritima]	58	32	393
23	2	2841	1669	gi11276880	EpaG [Streptococcus thermophilus]	58	29	1173
23	10	9301	8090	pir1A31133[A311	diaminopimelate decarboxylase (EC 4.1.1.20) - Pseudomonas aeruginosa	58	37	1212
38	29	22555	22884	gi1973249	vestitone reductase [Medicago sativa]	58	37	330
44	1	2	406	gi1289272	ferrichrome-binding protein [Bacillus subtilis]	58	33	405
45	1	1	552	gi129464	embryonic myosin heavy chain (1085 AA) (Homo sapiens) Ir/S12460/S12460 myosin beta heavy chain - human	58	33	552
55	2	759	538	gi1158852	glucose regulated protein [Echinococcus multilocularis]	58	32	222
62	13	8493	8068	gi1975353	kinase-associated protein B [Bacillus subtilis]	58	35	426
63	3	1553	1717	gi1166926	[Arabidopsis thaliana unidentified mRNA sequence, complete cds. 1, one product [Arabidopsis thaliana]	58	35	165

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
67	13	12017	11229	gi 1228083	NADH dehydrogenase subunit 2 [Chorhippus pallidus]	58	41	789
96	8	8208	9167	gi 708992	hypothetical protein [Bacillus subtilis]	58	42	960
107	2	2065	1364	gi 806327	Escherichia coli hpaA gene for A protein similar to yeast PAP16 and RP22 [Escherichia coli]	58	37	702
112	7	4519	5613	gi 155588	glucose-fructose oxidoreductase [Zymomonas mobilis] pfr[A42289]A42289 glucose-fructose oxidoreductase (EC 1.1.1.1) precursor - Zymomonas mobilis	58	38	1095
114	6	7318	6503	gi 1377843	unknown [Bacillus subtilis]	58	38	816
143	12	2261	1395	plr[A45605]A456	mature-parasite-infected erythrocyte surface antigen MESA - Plasmodium falciparum	58	31	867
151	2	717	950	gi 1370261	unknown [Mycobacterium tuberculosis]	58	31	234
154	6	6015	4627	gi 1209277	pCTHm1 gene product [Chlamydia trachomatis]	58	41	1389
154	16	14281	13541	gi 146613	DNA ligase (EC 6.5.1.2) [Escherichia coli]	58	39	741
155	3	2269	1892	gi 1303917	YglB [Bacillus subtilis]	58	34	378
174	1	1056	559	gi 304198	hypothetical protein [Bacillus subtilis]	58	26	528
189	4	1533	1769	gi 167383	DNA binding protein (probable) [Bacillus subtilis]	58	25	237
201	3	2669	3307	gi 1511453	endonuclease III [Methanococcus jannaschii]	58	34	639
208	1	2	238	gi 1276729	phycobilisome linker polypeptide [Porphyra purpurea]	58	29	237
220	11	14575	13058	gi 197526	clumping factor [Staphylococcus aureus]	58	51	1518
231	3	1629	1474	gi 1002520	HutS [Bacillus subtilis]	58	45	156
233	6	4201	3497	gi 1463023	No definition line found [Caenorhabditis elegans]	58	39	705
243	10	9303	10082	gi 537207	ORF_1277 [Escherichia coli]	58	32	780
257	1	331	1143	gi 1340128	ORF1 [Staphylococcus aureus]	58	44	813
302	2	460	801	gi 140174	ORF X [Bacillus subtilis]	58	34	342
307	11	6984	6127	gi 1303842	YnU [Bacillus subtilis]	58	30	858
321	3	1914	2747	gi 1239996	hypothetical protein [Bacillus subtilis]	58	41	834
342	4	2724	3497	gi 1454838	ORF 6; putative [Pseudomonas aeruginosa]	58	41	774
348	1	1	663	gi 1457478	unknown [Bacillus subtilis]	58	36	663
401	2	384	605	gi 143407	para-aminobenzoic acid synthase, component 1 (pab) [Bacillus subtilis]	58	53	222

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
437	1	325	1554	gi11301866	YopS [Bacillus subtilis]	58	35	1230
445	1	105	1442	gi1581363	protein A [Staphylococcus aureus]	58	52	1338
453	3	789	965	gi11009455	unknown [Schizosaccharomyces pombe]	58	34	177
453	5	2748	2047	gi1537214	YJG gene product [Escherichia coli]	58	40	702
479	2	731	1444	gi11256621	26.7% of identity in 165 aa to a Thermophilic bacterium hypothetical protein 6; putative [Bacillus subtilis]	58	36	714
490	1	909	547	gi1580920	rodd (gtaA) polypeptide (AA 1-673) [Bacillus subtilis] pir[S06048]S06048 probable rodd protein - Bacillus subtilis sp P13484 TAGE_BACSU PROBABLE POLY(GLYCEROL-PHOSPHATE) LPGA-GLUCOSYLTRANSFERASE (EC 2.4.1.52) (TECHOIC ACID BIOSYNTHESIS PROTEIN E)	58	36	363
517	1	1	1164	gi1472641018	HYPOTHETICAL HELICASE HQ018	58	30	1164
517	6	4182	4544	gi1451422	orf268 gene product [Mycoplasma hominis]	58	29	363
546	3	2802	4019	gi1886052	restriction modification system S subunit [Spiroplasma citri] gi1886052 restriction modification system S subunit [Spiroplasma citri]	58	37	1218
562	1	3	179	gi143831	InfS protein (AA 1-400) [Klebsiella pneumoniae]	58	34	177
600	2	1347	1156	gi11181839	unknown [Pseudomonas aeruginosa]	58	48	192
604	2	1231	1001	gi11001353	hypothetical protein [Synchocystis sp.]	58	41	231
619	1	1	504	gi1903748	integral membrane protein [Homo sapiens]	58	43	504
625	1	2	364	gi11208474	hypothetical protein [Synchocystis sp.]	58	43	363
635	1	1492	755	gi11510995	transaldolase [Methanococcus jannaschii]	58	41	738
645	1	1	846	gi1677882	ileal sodium-dependent bile acid transporter [Rattus norvegicus] gi1677882 ileal sodium-dependent bile acid transporter [Rattus norvegicus]	58	33	846
645	3	906	1556	gi11239599	hypothetical protein [Bacillus subtilis]	58	41	651
665	1	771	532	gi11204262	hypothetical protein (CB:110128_61) [Haemophilus influenzae]	58	39	240
674	1	635	327	gi1498817	ORF8; homologous to small subunit of phage terminases [Bacillus subtilis]	58	39	309
675	2	1312	806	gi142181	osmc gene product [Escherichia coli]	58	28	507
745	1	618	310	gi11205432	coxsyme PQQ synthase protein III [poq117] [Haemophilus influenzae]	58	32	309
799	2	242	1174	gi11204669	collagenase [Haemophilus influenzae]	58	36	933
800	2	1096	614	gi1171963	tRNA isopentenyl transferase [Saccharomyces cerevisiae] sp P07884 MOD5_YEAST TRNA ISOPENTENYLTRANSFERASE (EC 2.5.1.8) ISOPENTENYL-DIPHOSPHATE: TRNA ISOPENTENYLTRANSFERASE (IPPT TRANSFERASE) (IPPT)	58	37	483

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
854	1	1108	605	gi 466778	lysine specific permease [Escherichia coli]	58	44	504
885	1	481	242	gi 861199	protoporphyrin IX Mg-chelatase subunit precursor [Hordeum vulgare]	58	33	240
891	1	3	527	gi 1293660	AbxA2 [Streptomyces coelicolor]	58	31	525
942	1	931	467	gi 405567	traH [Pseudomonas aeruginosa]	58	30	465
1002	1	952	521	gi 577649	prelucM [Staphylococcus aureus]	58	34	432
1438	1	1	261	gi 581558	isooleucyl tRNA synthetase [Staphylococcus aureus] sp P41368 SYIP-STAAU ISOLEUCYL-TRNA SYNTHETASE, MUPIROCIN RESISTANT EC 6.1.1.5 [ISOLEUCINE-- THIA LIGASE] (ILERS) (MUPIROCIN RESISTANCE PROTEIN)	58	30	261
1442	1	2	463	gi 971394	similar to Acc. No. D26185 [Escherichia coli]	58	34	462
1873	1	480	241	gi 1339951	small subunit of NADH-dependent glutamate synthase [Plectonaea boryanum]	58	38	240
1876	1	3	158	gi 529216	No definition line found [Caenorhabditis elegans] sp P46503 VLX7_CAEEL HYPOTHETICAL 7.3 KO PROTEIN F23F12.7 IN HROHOSOME III.	58	33	156
1989	1	108	401	gi 1405458	YneR [Bacillus subtilis]	58	29	294
2109	1	3	401	gi 1001801	hypothetical protein [Synechocystis sp.]	58	31	399
2473	1	288	145	gi 510140	lipoendopeptidase F [Lactococcus lactis]	58	38	144
2523	1	452	228	gi 644873	catabolic dehydroquinase dehydratase [Acinetobacter calcoaceticus]	58	37	225
3041	1	2	211	gi 1205367	oligopeptide transport ATP-binding protein [Haemophilus influenzae]	58	39	210
3094	1	3	263	gi 1185288	isochorismate synthase [Bacillus subtilis]	58	38	261
3706	1	3	383	gi 456614	mevalonate kinase [Arabidopsis thaliana]	58	48	381
3854	1	1	402	gi 608869	human gcp372 [Homo sapiens]	58	32	402
4082	1	51	224	gi 508551	ribulose-1,5 biphosphate carboxylase large subunit -methyltransferase [Pisum sativum]	58	37	174
4278	1	3	206	gi 180189	cerebellar-degeneration-related antigen (CDR34) [Homo sapiens] gi 182737 cerebellar degeneration-associated protein [Homo sapiens] p1r[A29770]A29770 cerebellar degeneration-related protein - human	58	37	204
19	7	7818	7363	gi 1001516	hypothetical protein [Synechocystis sp.]	57	31	456
23	11	9663	8872	gi 606066	ORF_1256 [Escherichia coli]	57	29	792
31	1	4801	2402	gi 153146	ORF3 [Streptomyces coelicolor]	57	32	2400
38	14	11611	10796	gi 144859	ORF B [Clostridium perfringens]	57	31	816
46	14	12083	13046	gi 1001319	hypothetical protein [Synechocystis sp.]	57	25	984

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
51	3	1411	1187	gi 133856 B338	hypothetical 80K protein - Bacillus sphaericus	57	38	225
54	1	1	453	gi 1684950	staphylococcal accessory regulator A [Staphylococcus aureus]	57	31	453
75	1	3	239	gi 1000470	C27B7.7 [Caenorhabditis elegans]	57	42	237
92	5	3855	3061	gi 143607	sporulation protein [Bacillus subtilis]	57	35	795
96	3	4006	4773	gi 144297	acetate esterase (XycC) [Caldocellum saccharolyticum] pir B37202 B37202	57	34	768
					acetyltransferase (EC 3.1.1.6) (XycC) - Caldocellum saccharolyticum			
107	3	1480	2076	gi 460955	TagE [Vibrio cholerae]	57	42	597
109	8	5340	5933	gi 1416846	Unknown [Bacillus subtilis]	57	41	594
112	9	6679	7701	gi 1486250	Unknown [Bacillus subtilis]	57	33	1023
114	4	6384	4108	gi 1871456	putative alpha subunit of formate dehydrogenase [Methanobacterium thermotrophicum]	57	37	2277
126	2	430	1053	gi 288301	ORF2 gene product [Bacillus megaterium]	57	37	624
131	5	6537	6277	gi 1511160	M. jannaschii predicted coding region M3163 [Methanococcus jannaschii]	57	38	261
133	3	2668	2201	gi 1303912	Yqdw [Bacillus subtilis]	57	40	468
133	4	3383	3784	gi 1221884	[tucea7] amidolyase [Haemophilus influenzae]	57	37	600
147	4	2164	1694	gi 467469	Unknown [Bacillus subtilis]	57	33	471
160	2	1293	1060	gi 558604	chitin synthase 2 [Neurospora crassa]	57	28	234
163	8	5687	4764	gi 145580	carD gene product [Escherichia coli]	57	38	924
168	6	4336	5325	gi 39782	33kDa lipoprotein [Bacillus subtilis]	57	32	990
170	5	3297	3455	gi 503404	Ver164p [Saccharomyces cerevisiae]	57	37	159
221	6	8026	6809	gi 1134221	carboxypeptidase [Sulfolobus solfataricus]	57	32	1218
228	3	1348	1791	gi 288969	fibronectin binding protein [Streptococcus dysgalactiae] pir B33850 B33850	57	32	444
					fibronectin-binding protein - Streptococcus dysgalactiae			
263	4	4411	3686	gi 1185002	dihydrodipicolinate reductase [Pseudomonas syringae pv. tabaci]	57	42	726
276	1	494	255	gi 396380	No definition line found [Escherichia coli]	57	40	240
283	2	335	1324	gi 773349	BirA protein [Bacillus subtilis]	57	32	990
297	1	469	236	gi 1334820	reading frame v [Cauliflower mosaic virus]	57	46	234
342	3	1993	2805	gi 1204431	hypothetical protein (SP:P33644) [Haemophilus influenzae]	57	35	813

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
375	6	1140	3741	gi 385177	cell division protein (Bacillus subtilis)	57	26	402
433	6	1286	4011	gi 1524117	alpha-acetolactate decarboxylase (Lactococcus lactis)	57	40	726
470	3	903	1145	gi 1404819	protein arginine/threonine kinase (Toxoplasma gondii)	57	30	243
487	5	1391	1723	gi 507323	ORF1 (Bacillus stearothermophilus)	57	28	331
498	1	274	852	gi 1134549	NADH-ubiquinone oxidoreductase subunit 4L (Podospora anserina)	57	34	579
503	1	343	175	gi 1502283	organic cation transporter OCT2 (Rattus norvegicus)	57	30	171
505	2	1619	1284	gi 1466884	B1496.C2.194 (Mycobacterium leprae)	57	40	336
519	2	1182	2549	gi 1103707	YrbM (Bacillus subtilis)	57	34	1368
522	2	3234	1945	gi 1064809	homologous to sp.HTRA_ECOLI (Bacillus subtilis)	57	36	1290
538	2	909	1415	gi 153179	phosphorinothricin N-acetyltransferase (Streptomyces coelicolor) pirJH0246/JH0246 phosphinothricin N-acetyltransferase (EC 2.3.1.-)	57	40	507
547	1	968	486	gi 1467340	unknown (Bacillus subtilis)	57	30	483
599	1	1062	532	sp P20652 PYRA	PREPENATE DEHYDROGENASE (EC 1.3.1.12) (PDIH)	57	41	531
620	2	757	572	gi 1107894	unknown (Schizosaccharomyces pombe)	57	38	186
622	2	1600	1130	gi 173028	thioredoxin 11 (Saccharomyces cerevisiae)	57	39	471
625	2	362	1114	gi 1262366	hypothetical protein (Mycobacterium leprae)	57	34	753
680	1	1	204	gi 143544	RNA polymerase sigma-30 factor (Bacillus subtilis) pirJ28625/A28625 transcription initiation factor sigma H - actillus subtilis	57	30	204
690	1	3	629	gi 1466520	pocr (Salmonella typhimurium)	57	29	627
696	1	2	433	gi 113972	ipa-48c gene product (Bacillus subtilis)	57	33	432
704	1	36	638	gi 1499931	M. jannaschii predicted coding region M21003 (Methanococcus jannaschii)	57	36	603
732	1	2316	1621	gi 1418999	lorf4 (Lactobacillus sake)	57	37	696
746	1	451	227	gi 1392973	Rab3 (Aplysia californica)	57	42	225
757	1	20	466	gi 143979	L. curvatus small cryptic plasmid gene for rep protein (Lactobacillus rvaus)	57	45	447
862	1	2	295	gi 1303827	YqiI (Bacillus subtilis)	57	21	294
1049	1	907	455	gi 1510108	ORF-1 (Agrobacterium tumefaciens)	57	35	451
1117	1	1387	695	gi 896286	WH2 terminus uncertain (Leishmania tarentolae)	57	28	693

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
1136	1	2	322	gi1303853	YqgF (Bacillus subtilis)	57	38	321
1144	2	1033	611	gi1310083	voltage-activated calcium channel alpha-1 subunit [Rattus norvegicus]	57	46	423
1172	1	1472	738	gi1511146	H. jannaschii predicted coding region HJ1143 [Methanococcus jannaschii]	57	28	735
1500	2	746	558	gi142780	putative membrane protein; putative [Bacillus subtilis]	57	35	189
1676	1	659	399	gi1313777	uracil permease [Escherichia coli]	57	31	261
2481	1	2	400	gi1237015	ORF4 [Bacillus subtilis]	57	23	399
3099	1	3	230	gi1204540	isochloramate synthase [Haemophilus influenzae]	57	19	228
3122	1	360	181	gi1882472	ORF_0464 [Escherichia coli]	57	40	180
3560	1	2	361	gi153490	tetracycline C resistance and export protein [Streptomyces laevis]	57	37	360
3850	1	856	434	gi155588	glucose-fructose oxidoreductase [Zymomonas mobilis] pir[A42289]A42289	57	40	423
					glucose-fructose oxidoreductase (EC 1.1.1.-) recursor - Zymomonas mobilis			
3931	1	704	354	gi141353	lpa-29d gene product [Bacillus subtilis]	57	36	351
3993	1	1	384	gi151259	HM-CoA reductase (EC 1.1.1.88) [Pseudomonas nevalonii] pir[A44756]A44756	57	39	384
					hydroxymethylglutaryl-CoA reductase (EC 1.1.1.88) Pseudomonas sp.			
4065	1	793	398	pirJUV0037RDEC	nitrate reductase (EC 1.7.99.4) alpha chain - Escherichia coli	57	31	396
4100	1	596	300	gi1086633	T06C10.5 gene product [Caenorhabditis elegans]	57	47	297
4163	1	571	247	gi121512	potatin [Solanum tuberosum]	57	50	245
4267	2	631	335	gi1000365	SpoIIAG [Bacillus subtilis]	57	38	297
4358	1	3	302	gi1298032	EF [Streptococcus suis]	57	32	300
4389	2	108	290	gi1405894	1-phosphofructokinase [Escherichia coli]	57	37	183
4399	1	2	232	gi1483603	Pristinamycin I synthase I [Streptomyces pristinaespiralis]	57	35	231
4481	1	572	288	gi1405879	lyoH [Escherichia coli]	57	44	285
4486	1	512	258	gi1515938	glutamate synthase (ferredoxin) [Synecocystis sp.] pir[s46957]s46957	57	42	255
					glutamate synthase (ferredoxin) (EC 1.4.7.1) - Synecocystis sp.			
4510	1	481	242	gi1205301	leukotoxin secretion ATP-binding protein [Haemophilus influenzae]	57	38	240
4617	1	468	256	gi1511222	restriction modification enzyme, subunit M1 [Methanococcus jannaschii]	57	35	213
4	11	12201	11524	gi149204	histidine utilization repressor C [Klebsiella aerogenes] pir[A36730]A36730	56	31	678
					hutG protein - Klebsiella pneumoniae (fragment) sp[P19452]HUTG_KLEAE			
					FORMINOGUTANASE (EC 3.5.3.8) FORMINOGUTANATE HYDROLASE (HISTIDINE UTILIZATION PROTEIN G) FRAGMENT			

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
22	8	4248	5177	gi 1372222	RACH1 (Homo sapiens)	56	33	930
38	28	21179	22264	gi 1480705	lipote-protein ligase (Mycoplasma capricolum)	56	34	1086
44	3	1861	2421	gi 490320	Y gene product (unidentified)	56	31	561
44	35	10103	10606	gi 1205099	hypothetical protein (G8:U19201.1) (Haemophilus influenzae)	56	39	504
50	6	4820	5161	gi 209931	fiber protein (Human adenovirus type 5)	56	48	342
53	4	2076	2972	gi 623476	transcriptional activator (Providencia stuartii) sp P43463 AARP_PROST TRANSCRIPTIONAL ACTIVATOR AARP	56	30	897
67	6	5656	6594	gi 466613	nikB (Escherichia coli)	56	32	939
89	3	2364	1810	gi 482922	protein with homology to pail repressor of B. subtilis (Lactobacillus elbrueckii)	56	39	555
96	1	203	913	gi 145594	cAMP receptor protein (crp) (Escherichia coli)	56	35	711
109	21	18250	17846	gi 1204367	hypothetical protein (G8:U14003.278) (Haemophilus influenzae)	56	27	405
112	8	5611	6678	gi 155588	glucose-fructose oxidoreductase (Zymomonas mobilis) pfr A42289 A42289 glucose-fructose oxidoreductase (LC 1.1.-) reductor - Zymomonas mobilis	56	40	1068
131	3	6404	5100	gi 619724	MgtE (Bacillus firmus)	56	30	1305
138	2	65	232	gi 413948	ipa-24d gene product (Bacillus subtilis)	56	31	168
138	4	823	1521	gi 580868	ipa-23r gene product (Bacillus subtilis)	56	31	699
146	2	740	447	gi 1046009	M. genitalium predicted coding region MG309 (Mycoplasma genitalium)	56	37	291
149	2	1639	1067	gi 945380	terminase small subunit (Bacteriophage LU-11)	56	35	573
163	1	2	223	gi 143947	glucamine synthetase (Bacteroides fragilis)	56	30	222
166	5	6745	6449	gi 405792	ORF154 (Pseudomonas putida)	56	26	297
187	1	31	393	gi 311237	H(+)-transporting ATP synthase (Zea mays)	56	30	363
190	1	2	373	gi 1109686	ProX (Bacillus subtilis)	56	35	372
191	8	11538	9943	gi 581070	acyl coenzyme A synthetase (Escherichia coli)	56	35	1596
195	1	1291	647	gi 1510242	collagenase (Methanococcus jannaschii)	56	34	645
230	3	2323	2072	gi 40363	heat shock protein (Clostridium acetobutylicum)	56	39	252
238	5	3383	3775	gi 1677533	sarA (Staphylococcus aureus)	56	31	393
270	2	813	1712	gi 765073	autolysin (Staphylococcus aureus)	56	41	900

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S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
290	1	3221	1622	gi 547513	orf3 [Haemophilus influenzae]	56	34	1590
297	5	1140	1373	gi 5151556	M. jannaschii predicted coding region MJ1561 [Methanococcus jannaschii]	56	40	234
321	2	2947	1799	gi 1001801	hypothetical protein [Synecocystis sp.]	56	31	1149
359	2	1279	641	gi 46336	inolI gene product [Rhizobium meliloti]	56	26	639
371	2	360	1823	gi 145304	u-ribulokinase [Escherichia coli]	56	39	1464
391	4	1762	2409	gi 1001634	hypothetical protein [Synecocystis sp.]	56	34	648
402	1	380	192	gi 1438904	5-Hr4L receptor [Homo sapiens]	56	48	189
416	4	2480	2109	gi 1408486	HST4A gene product [Bacillus subtilis]	56	31	372
424	3	1756	2334	gi 142471	acetolactate decarboxylase [Bacillus subtilis]	56	32	579
457	1	1907	1017	gi 1205194	formamidopyrimidine-DNA glycosylase [Haemophilus influenzae]	56	36	891
458	2	2423	1812	gi 15466	terminase [Bacteriophage SP1]	56	37	612
504	2	2152	1283	gi 1142681	lpp38 [Pasteurella haemolytica]	56	38	870
511	1	1	1284	gi 217049	brnQ protein [Salmonella typhimurium]	56	37	1284
604	3	1099	1701	gi 467109	rfa; 30S ribosomal protein S18 alanine acetyltransferase; 229_C1_170 [Mycobacterium leprae]	56	43	603
660	5	3547	3774	gi 1229106	ZK930.1 [Caenorhabditis elegans]	56	30	228
707	1	35	400	gi 153929	NADPH-sulfite reductase [flavoprotein component [Salmonella typhimurium]	56	38	306
709	2	1385	1095	gi 1510801	hydrogenase accessory protein [Methanococcus jannaschii]	56	38	291
718	1	1	495	gi 413948	lpa-24d gene product [Bacillus subtilis]	56	35	495
743	1	87	677	gi 928636	repressor protein [Lactococcus lactis phage BK5-7]	56	35	591
790	1	776	399	gi 1511513	ABC transporter, probable ATP-binding subunit [Methanococcus jannaschii]	56	33	378
795	1	3	407	gi 1205382	cell division protein [Haemophilus influenzae]	56	34	405
813	1	19	930	gi 1222161	permease [Haemophilus influenzae]	56	28	912
855	1	3	515	gi 1256621	26.7% of identity in 165 aa to a Thermophilic bacterium hypothetical protein 6; putative [Bacillus subtilis]	56	33	513
968	1	2	466	gi 547513	orf3 [Haemophilus influenzae]	56	37	465
973	2	1049	732	gi 866022	HexR [Pseudomonas aeruginosa]	56	31	318
1203	1	5	223	gi 184251	RHG-1 [Homo sapiens]	56	34	219

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S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
1976	1	452	237	gi 19806	lysine-rich aspartic acid-rich protein [Plasmodium chabaudi] r[S2183]S2183 lysine/aspartic acid-rich protein - Plasmodium baudi	56	33	216
2161	1	2	400	gi 1237015	ORF4 (Bacillus subtilis)	56	27	399
2958	1	362	183	gi 466685	No definition line found [Escherichia coli]	56	26	180
2979	1	421	212	gi 1204354	spore germination and vegetative growth protein [Haemophilus influenzae]	56	40	210
2994	2	526	326	gi 1836646	phosphoribosylformimino-praic ketolomerase [Rhodobacter phaeoideus]	56	29	201
3026	1	177	328	gi 143306	penicillin V amidase [Bacillus sphaericus]	56	30	150
3149	1	289	146	gi 1166604	similar to aldehyde dehydrogenase [Caenorhabditis elegans]	56	37	144
3770	1	61	401	gi 129145	acetyl-CoA C-acyltransferase [Mangifera indica]	56	43	339
4034	2	720	361	gi 1205355	Na ⁺ /H ⁺ antiporter [Haemophilus influenzae]	56	31	360
4145	1	1	324	gi 1726095	long-chain acyl-CoA dehydrogenase [Mus musculus]	56	36	324
4200	1	505	254	gi 155588	glucose-fructose oxidoreductase [Zymomonas mobilis] pIc[A42289]A42289 glucose-fructose oxidoreductase (EC 1.1.-.-) recursor - Zymomonas mobilis	56	40	252
4273	1	675	355	gi 308861	IGTC start codon [Lactococcus lactis]	56	33	321
1	3	4095	3436	gi 5341	putative orf YCLM8C, len:192 [Saccharomyces cerevisiae] r[S53591]S53591 hypothetical protein - yeast [Saccharomyces cerevisiae]	55	25	660
11	12	9377	8505	gi 216773	halocatalase dehalogenase H-1 [Moraxella sp.]	55	32	873
12	4	5133	4534	gi 467337	unknown [Bacillus subtilis]	55	26	600
19	5	5404	5844	gi 1001719	hypothetical protein [Synchocystis sp.]	55	25	441
23	13	14087	12339	gi 474190	lucA gene product [Escherichia coli]	55	30	1749
32	7	5368	6888	gi 1340056	unknown [Mycobacterium tuberculosis]	55	37	1521
34	3	2569	1808	gi 1303968	YqjO [Bacillus subtilis]	55	39	762
34	5	3960	3412	gi 1303962	YqjK [Bacillus subtilis]	55	33	549
36	1	1291	647	gi 506045	ORF_018 [Escherichia coli]	55	27	645
36	6	6220	5243	gi 1001341	hypothetical protein [Synchocystis sp.]	55	31	978
47	3	3054	3021	gi 1001819	hypothetical protein [Synchocystis sp.]	55	21	768
49	1	2065	1127	gi 403373	glycerophosphoryl diester phosphodiesterase [Bacillus subtilis] pIc[S57251]S57251 glycerophosphoryl diester phosphodiesterase - acillus subtilis	55	36	919

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S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
67	11	8966	9565	gi1153053	norA199 protein [Staphylococcus aureus]	55	23	600
75	3	881	1273	gi1161698	L-histidinol: NAD ⁺ oxidoreductase (EC 1.1.1.23) (aa 1-434) [scherichia coli]	55	33	393
82	9	15387	14194	gi11136221	carboxypeptidase [Sulfolobus solfataricus]	55	35	1194
87	4	3517	4917	gi11064812	function unknown [Bacillus subtilis]	55	26	1401
88	2	1172	1636	gi1082463	protein-Nip1-phosphohistidine-sugar phosphotransferase [Escherichia coli]	55	35	465
92	1	127	516	gi11377832	unknown [Bacillus subtilis]	55	36	390
100	2	836	2035	gi11370274	zeaxanthin epoxidase [Nicotiana glauca]	55	36	1200
100	5	5137	4658	gi1396660	unknown open reading frame [Buchnera aphidicola]	55	29	480
109	3	4266	2986	gi11499866	M. jannaschii predicted coding region MJ1024 [Methanococcus jannaschii]	55	31	1281
114	3	2616	1834	gi11511367	formate dehydrogenase, alpha subunit [Methanococcus jannaschii]	55	29	783
144	3	1805	1476	gi11100787	unknown [Saccharomyces cerevisiae]	55	35	330
165	5	6212	5508	gi11045884	M. genitalium predicted coding region MG199 [Mycoplasma genitalium]	55	27	705
189	5	2205	2576	gi1142569	ATP synthase alpha subunit [Bacillus firmus]	55	35	372
191	6	9136	6857	gi1559411	B0272.3 [Caenorhabditis elegans]	55	39	2280
194	2	364	636	gi1145768	K7 kinesin-like protein [Dictyostellium discoideum]	55	34	273
209	4	1335	1676	gi1473357	thi4 gene product [Schizosaccharomyces pombe]	55	35	342
211	2	1693	1145	gi1410130	ORFX6 [Bacillus subtilis]	55	37	549
213	2	644	1372	gi1633692	TrsA [Yersinia enterocolitica]	55	28	729
214	7	4144	5481	gi11001793	hypothetical protein [Synecocystis sp.]	55	30	1338
221	7	11473	9197	gi1466520	pocr [Salmonella typhimurium]	55	32	2277
233	8	5908	4817	gi11237083	unknown [Mycobacterium tuberculosis]	55	38	1092
236	4	1375	2340	gi1146199	putative [Bacillus subtilis]	55	32	966
243	2	380	1885	gi1459907	mercuric reductase [Plasmodium falciparum]	55	29	1506
258	1	786	394	gi1455006	orf6 [Rhodococcus fascians]	55	36	393
281	1	126	938	gi11408493	homologous to SwissProt:YIDA_ECOLI hypothetical protein [Bacillus subtilis]	55	35	813
316	3	1323	2102	gi11486447	LuxA homologue [Rhizobium sp.]	55	30	780
326	5	2968	2744	gi11296824	proline iminopeptidase [Lactobacillus helveticus]	55	36	225

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S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
351	2	2322	1429	gi1204820	hydrogen peroxide-inducible activator [Haemophilus influenzae]	55	28	894
353	4	2197	2412	gi1272475	chitin synthase [Erwinella nidulans]	55	50	216
380	1	14	379	gi142554	ATP synthase 1 subunit [Bacillus megaterium]	55	37	366
383	1	462	232	gi138272	terricidin-binding protein [Bacillus subtilis]	55	36	231
386	1	3	938	gi1510251	DNA helicase, putative [Methanococcus jannaschii]	55	30	936
410	2	1208	1891	gi1205144	multidrug resistance protein [Haemophilus influenzae]	55	27	684
483	2	411	833	gi1413934	lpe-10r gene product [Bacillus subtilis]	55	26	423
529	3	1777	1433	gi1606150	ORF_1309 [Escherichia coli]	55	33	345
555	1	1088	585	gi143407	para-aminobenzoic acid synthase, component 1 [peb] [Bacillus subtilis]	55	28	504
565	1	402	202	gi1223961	CDP-tylucose epimerase [Yersinia pseudotuberculosis]	55	41	201
582	1	751	452	gi1256643	20.2% identity with NADH dehydrogenase of the Leishmania major mitochondrion; putative [Bacillus subtilis]	55	36	300
645	5	2260	2057	gi1210824	[fusion protein F [bovine respiratory syncytial virus] pirJQ1481]VORZBA [fusion glycoprotein precursor - bovine respiratory syncytial virus (strain AS1908)]	55	25	204
672	2	957	2216	gi1511333	M. jannaschii predicted coding region NJ1222 [Methanococcus jannaschii]	55	36	1260
730	1	955	479	gi1537007	ORF_1379 [Escherichia coli]	55	30	477
737	1	1859	945	gi1536963	CG Site No. 18166 [Escherichia coli]	55	30	915
742	2	228	572	gi1304160	product unknown [Bacillus subtilis]	55	38	345
817	2	1211	903	gi11136289	histidine kinase A [Dictyostelium discoideum]	55	29	309
819	1	582	355	gi1558073	polymorphic antigen [Plasmodium falciparum]	55	22	228
832	2	1152	724	gi1403167	ORF_C [Clostridium acetobutylicum]	55	32	429
840	1	769	386	gi11203875	pseudouridylyl synthase 1 [Haemophilus influenzae]	55	39	384
1021	1	23	529	gi148563	beta-lactamase [Yersinia enterocolitica]	55	38	507
1026	1	60	335	gi147804	Opp C [MAL-301] [Salmonella typhimurium]	55	26	276
1535	1	1	282	gi11477533	saarA [Staphylococcus aureus]	55	29	282
1814	2	224	985	gi1046078	H. genitalium predicted coding region HG369 [Mycoplasma genitalium]	55	38	762
3254	1	427	254	gi1413968	lps-44d gene product [Bacillus subtilis]	55	30	174

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S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	Length (nt)
3695	1	686	345	gi1216773	haloacetate dehalogenase H-1 (Moraxella sp.)	55	32	342
3721	1	1	312	gi142029	ORF1 gene product (Escherichia coli)	55	31	312
3799	1	3	272	gi142029	ORF1 gene product (Escherichia coli)	55	38	270
3889	1	22	423	gi1129145	acetyl-CoA C-acyltransferase (Mangifera indica)	55	45	402
3916	1	2	385	gi1529754	lapeC (Streptococcus pyogenes)	55	38	384
3945	1	4	198	gi1476252	phase 1 flagellin (Salmonella enterica)	55	36	195
4074	1	488	246	gi142029	ORF1 gene product (Escherichia coli)	55	38	243
4144	1	2	343	gi11524267	unknown (Mycobacterium tuberculosis)	55	28	342
4284	1	14	208	gi1100774	ferredoxin-dependent glutamate synthase (Synecocystis sp.)	55	36	195
4457	2	644	378	gi1180189	cerebellar-degeneration-related antigen (CDR34) (Homo sapiens) gi1182737 cerebellar degeneration-associated protein (Homo sapiens) p1r1429770/c29770 cerebellar degeneration-related protein - human	55	38	267
4514	1	2	244	gi1216773	haloacetate dehalogenase H-1 (Moraxella sp.)	55	32	243
4599	1	432	217	gi1129145	acetyl-CoA C-acyltransferase (Mangifera indica)	55	42	216
4606	1	416	210	gi1386120	myosin alpha heavy chain (S2 subfragment) (rabbits, masseter, epitide Partial, 214 aa)	55	27	207
5	8	5348	4932	gi1536069	ORF YBL07c (Saccharomyces cerevisiae)	54	27	417
12	7	7166	6165	gi11205504	homoserine acetyltransferase (Haemophilus influenzae)	54	30	1002
23	16	17086	15326	gi1474192	lucC gene product (Escherichia coli)	54	31	1761
35	1	2	979	gi148054	small subunit of soluble hydrogenase (AA 1-384) (Synecococcus sp.) lr1506919/HQVCS soluble hydrogenase (EC 1.12.-.-) small chain - methanococcus sp. (PCC 6716)	54	36	978
37	11	9437	8667	gi1537207	ORF_f277 (Escherichia coli)	54	38	771
37	12	8165	8332	gi11160967	palmitoyl-protein thioesterase (Homo sapiens)	54	37	168
46	15	13025	13804	gi1438473	protein is hydrophobic, with homology to E. coli Prw: putative Bacillus subtilis	54	28	780
56	2	203	736	gi11256139	ybbJ (Bacillus subtilis)	54	34	534
57	13	11117	10179	gi1151248	inosine-uridine preferring nucleoside hydrolase (Crithidia fasciculata)	54	32	919
66	2	516	1133	gi11335781	Cap (Drosophila melanogaster)	54	29	618
70	10	8116	8646	gi11398823	PhoE (Rhizobium meliloti)	54	31	531

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Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	V sim	V ident	length (nt)
70	15	112556	11801	[sp P02983 TCR_5	TETRACYCLINE RESISTANCE PROTEIN.	54	29	756
87	5	4915	5706	[gi 3064811	[function unknown [Bacillus subtilis]	54	33	792
92	4	3005	2289	[gi 1205366	[oligopeptide transport ATP-binding protein [Haemophilus influenzae]	54	33	717
103	2	2596	1556	[gi 710495	[protein kinase [Bacillus brevis]	54	33	1041
105	2	3585	2095	[gi 143727	[putative [Bacillus subtilis]	54	30	1491
112	4	2117	2732	[gi 153724	[MecC [Staphylococcus pneumoniae]	54	41	396
127	2	1720	2493	[gi 144297	[acetyl esterase (XycC) [Caldocellum saccharolyticum] pir B37202 B37202	54	34	774
138	5	1600	3306	[gi 42473	[pyruvate oxidase [Escherichia coli]	54	36	1707
152	2	525	1172	[gi 1377834	[unknown [Bacillus subtilis]	54	23	648
161	9	4831	5469	[gi 903305	[ORF73 [Bacillus subtilis]	54	28	639
161	13	6694	7251	[gi 1511039	[phosphate transport system regulatory protein [Methanococcus jannaschii]	54	32	558
164	6	3263	4543	[gi 1204976	[prolyl-CRNA synthetase [Haemophilus influenzae]	54	34	1281
164	20	21602	22243	[gi 143582	[spolIIIEA protein [Bacillus subtilis]	54	32	642
171	6	5683	4250	[gi 436965	[malA] gene products [Bacillus stearothermophilus] pir S43914 S43914	54	37	1434
					[hypothetical protein 1 - Bacillus stearothermophilus]			
206	18	19208	19720	[gi 1240016	[R09E10.3 [Caenorhabditis elegans]	54	38	513
218	2	1090	1905	[gi 467376	[unknown [Bacillus subtilis]	54	26	816
220	1	1322	663	[gi 1353761	[myosin II heavy chain [Neogleria fowleri]	54	22	660
220	13	12655	13059	[pir S00485 S004	[gene 11-1 protein precursor - Plasmodium falciparum (fragments)]	54	35	405
221	3	2030	3709	[gi 1303813	[Yqew [Bacillus subtilis]	54	34	1680
272	7	5055	4219	[gi 62964	[arylamine N-acetyltransferase (AA 1-290) [Gallus gallus] fr S06652 XCHY3	54	33	837
					[arylamine N-acetyltransferase (EC 2.3.1.5) (clone NAT-3) - chicken]			
316	7	4141	4701	[gi 682769	[accE gene product [Escherichia coli]	54	31	561
316	10	6994	8742	[gi 413951	[lpa-27d gene product [Bacillus subtilis]	54	28	1749
338	3	3377	2214	[gi 490328	[LORF F (unidentified)]	54	28	1164
341	4	3201	3614	[gi 171959	[myosin-like protein [Saccharomyces cerevisiae]	54	25	414

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Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
346	1	1820	912	gi 396400	similar to eukaryotic Na ⁺ /H ⁺ exchangers [Escherichia coli] sp P22703 YJCE_ECOLI HYPOTHETICAL 60.5 KD PROTEIN IN SOX-RACS HYPERGENIC REGION (OS49)	54	30	909
348	2	623	1351	gi 537109	ORF_1343a [Escherichia coli]	54	34	729
378	2	1007	1942	sp P02983 TCR_S	TETRACYCLINE RESISTANCE PROTEIN	54	31	936
408	6	4351	5301	gi 474190	lucA gene product [Escherichia coli]	54	29	951
444	9	7934	8454	gi 216267	ORF2 [Bacillus megaterium]	54	32	921
463	2	2717	2229	gi 104160	product unknown [Bacillus subtilis]	54	50	489
502	2	1696	1133	gi 1205015	hypothetical protein (SP10120) [Haemophilus influenzae]	54	38	564
505	6	6262	5357	gi 1500558	2-hydroxyhepta-2,4-diene-1,7-diole isomerase [Methanococcus jannaschii]	54	41	906
550	1	2736	1522	gi 40100	rodc (cagJ) polypeptide (AA 1-746) [Bacillus subtilis] tr S06049 S06049 rodc protein - Bacillus subtilis p P1085 TRAP_BACSU TECHOLIC ACID BIOSYNTHESIS PROTEIN F.	54	35	1215
551	5	1305	4279	gi 950197	unknown [Corynebacterium glutamicum]	54	34	975
558	2	1356	958	gi 485090	No definition line found [Caenorhabditis elegans]	54	32	399
580	1	91	936	gi 331906	{used envelope glycoprotein precursor [Friend spleen focus-forming virus]	54	45	846
603	3	554	757	gi 1323423	ORF YCR234w [Saccharomyces cerevisiae]	54	36	204
617	1	25	249	gi 219959	ornithine transcarbamylase [Homo sapiens]	54	40	235
622	3	1097	1480	gi 1303873	vqg2 [Bacillus subtilis]	54	25	384
623	1	3	404	gi 1063250	low homology to P20 protein of Bacillus licheniformis and bleomycin acetyltransferase of Streptomyces verticillus [Bacillus subtilis]	54	45	402
689	1	1547	1011	gi 552446	NADH dehydrogenase subunit 4 [Apis mellifera ligustica] pir S52968 S52968 NADH dehydrogenase chain 4 - honeybee [chochondrion (SCC4)]	54	30	537
725	2	686	1441	gi 987096	sensory protein kinase [Streptomyces hygroscopicus]	54	26	756
956	1	1	249	pir S30782 S307	Integrin homolog - yeast [Saccharomyces cerevisiae]	54	24	249
978	2	1137	859	gi 1301994	ORF YNU091w [Saccharomyces cerevisiae]	54	33	279
1314	1	3	281	gi 1001108	hypothetical protein [Synecocystis sp.]	54	33	279
2450	1	1	228	gi 1045037	[ch-TOG [Homo sapiens]	54	32	228
2934	1	1	387	gi 580870	[ipa-37d qxa gene product] [Bacillus subtilis]	54	36	387
2970	1	499	251	sp P3734P VECE_	HYPOTHETICAL PROTEIN IN ASP5 5' REGION (FRAGMENT)	54	42	249

TABLE 2

S aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
3002	1	1	309	gi 44037	Protein [Lactococcus lactis]	54	33	309
3561	1	9	464	gi 151359	HMG-CoA reductase (EC 1.1.1.88) [Pseudomonas nevaloni] pir[A44756] A44756 hydroxymethylglutaryl-CoA reductase (EC 1.1.1.88) Pseudomonas sp.	54	35	456
3572	1	72	401	gi 450688	hadM gene of Ecoprr1 gene product [Escherichia coli] pir[S38437] S38437 hadM protein - Escherichia coli pir[S09629] S09629 hypothetical protein A - Escherichia coli (S08 40-520)	54	36	330
3829	1	798	400	gi 1322245	mevalonate pyrophosphate decarboxylase [Rattus norvegicus]	54	29	399
3909	1	1	273	gi 29865	ICNP-E (Homo sapiens)	54	30	273
3921	1	3	209	pir S24325 S243	glucan 1,6-beta-glucosidase (EC 3.2.1.74) - Pseudomonas fluorescens subsp. cellulosa	54	34	207
4438	1	566	285	gi 1196657	unknown protein [Mycoplasma pneumoniae]	54	30	282
4459	1	3	272	gi 1046081	hypothetical protein (GB:D26185_10) [Mycoplasma genitalium]	54	38	270
4564	1	3	221	gi 216267	ORF2 [Bacillus megaterium]	54	38	219
23	12	12538	10685	gi 674192	lucC gene product [Escherichia coli]	53	35	1854
23	14	14841	13579	gi 62029	ORF1 gene product [Escherichia coli]	53	32	1263
24	3	4440	3940	gi 1369947	c2 gene product [Bacteriophage B1]	53	36	501
26	4	3818	4618	gi 1486247	unknown [Bacillus subtilis]	53	37	801
38	6	2856	3998	gi 405840	Yell [Escherichia coli]	53	40	1143
38	10	9380	7806	gi 1399954	chryoid sodium/iodide symporter NIS [Rattus norvegicus]	53	29	1575
56	10	12324	13100	pir A54592 A545	110K actin filam. associated protein - chicken	53	32	225
57	6	5047	4583	pir A00341 DE2P	alcohol dehydrogenase (EC 1.1.1.1) - fission yeast (Schizosaccharomyces pombe)	53	39	465
57	12	10515	8932	gi 480429	putative transcriptional regulator [Bacillus stearothermophilus]	53	30	1584
67	12	9496	10218	gi 1511555	quinolone resistance nraA protein protein [Methanococcus jannaschii]	53	31	723
69	3	3125	2382	gi 1087017	arabinogalactan-protein, AGP [Nicotiana glauca, cell-suspension culture filtrate, Peptide, 461 aa]	53	30	744
79	1	3	1031	gi 1521802	glucanase [Anabaena variabilis]	53	32	1029
80	1	673	338	gi 52428	ATPase 3 [Plasmodium falciparum]	53	36	336
88	4	1910	2524	gi 137034	ORF_0488 [Escherichia coli]	53	25	615
88	5	2467	3282	gi 537034	ORF_0488 [Escherichia coli]	53	29	816

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
92	8	5870	5905	gi 399598	amphotropic murine retrovirus receptor [Rattus norvegicus]	53	33	366
94	5	4417	3239	gi 173038	tropomyosin (TPM1) [Saccharomyces cerevisiae]	53	25	1179
99	5	4207	5433	sp P28246 BCR_E	BICYCLOMYCIN RESISTANCE PROTEIN (SULFONAMIDE RESISTANCE PROTEIN)	53	30	1227
120	3	1639	2262	gi 576655	[ORF] [Vibrio anguillarum]	53	35	624
120	11	7257	8897	gi 1524397	glycine betaine transporter Opd [Bacillus subtilis]	53	33	1641
127	6	6893	5685	gi 1256630	putative [Bacillus subtilis]	53	32	1209
147	2	355	557	gi 581648	epib gene product [Staphylococcus epidermidis]	53	34	303
158	4	4705	4256	gi 151004	mucoicly regulatory protein Alor [Pseudomonas aeruginosa] pIr[A32802 A32802 regulatory protein alor - Pseudomonas aeruginosa ep P26275 ALOR_PSEAE POSITIVE ALGINATE BIOSYNTHESIS REGULATORY PROTEIN	53	32	450
171	7	5717	5421	gi 1510669	hypothetical protein (GP-D6404_18) [Methanococcus jannaschii]	53	34	297
191	9	113087	11483	gi 298085	acetoacetate decarboxylase [Clostridium acetobutylicum] pIr B49346 B49346 butyrate-acetoacetate CoA-transferase EC 2.3.1.91 small chain	53	31	1605
203	5	3763	4326	gi 143456	Clostridium acetobutylicum sp P33752 CTPA_CLOAB BUTYRATE-ACETOACETATE COA-TRANSFERASE SUBUNIT (EC 2.8.3.9) (CONT A)			
206	17	18204	18971	gi 304136	tpoe protein (tg start codon) [Bacillus subtilis]	53	29	564
212	10	4021	4221	gi 9878	acetylglutamate kinase [Bacillus stearothermophilus] sp 007905 AROB_BACST ACETYLGLUTAMATE KINASE (EC 2.7.2.8) (NAG INASE) (AGK) (N-ACETYL-L-GLUTAMATE 5-PHOSPHOTRANSFERASE)	53	36	768
231	2	1580	1350	gi 537506	protein kinase [Plasmodium falciparum]	53	28	201
272	6	2719	3249	gi A33141 A331	paramyosin [Dirofilaria immitis]	53	34	231
308	3	927	2576	gi 606292	hypothetical protein (gtid 3' region) - Streptococcus mutans	53	34	531
320	7	5645	5884	gi 160596	ORF_0696 [Escherichia coli]	53	33	1650
327	1	218	901	gi 854601	RNA polymerase III largest subunit [Plasmodium falciparum] sp P27625 RPCL_PLAFA DNA-DIRECTED RNA POLYMERASE III LARGEST SUBUNIT (EC 2.7.7.6)	53	33	240
341	2	212	2500	gi 633732	unknown [Schistosoma japonicum]	53	31	684
351	1	763	383	sp P31675 YABH_	ORF1 [Campylobacter jejuni]	53	31	3289
433	7	5087	4731	gi 1001961	HYPOTHETICAL 42.7 KD PROTEIN IN TBPA-LEUD INTERGENIC REGION (ORF104)	53	32	381
454	2	1240	980	gi A60128 A603	MHC class II analog [Staphylococcus aureus]	53	30	357
					40K cell wall protein precursor (sr 5' region) - Streptococcus mutans (strain OH2175, serotype f)	53	27	261

TABLE 2

R. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	RefSeq gene name	% sim	% ident	length (nt)
470	4	1123	1761	gi1516826	rat OCP360 (Rattus rattus)	53	30	639
483	1	432	217	gi1480429	putative transcriptional regulator [Bacillus stearothermophilus]	53	23	216
544	1	516	1259	gi146587	ORF 1 (AA 1 - 121) (1 is 2nd base in codon) [Staphylococcus aureus] tr E15765 E15765 hypothetical protein 1 (h1b 5' region) - aphyllococcus aureus (fragment)	53	38	744
558	10	3957	3754	gi115140	res gene [Bacteriophage P1]	53	32	204
603	2	339	620	gi1507738	Map IV [Vibrio parahaemolyticus]	53	26	282
693	1	1669	941	gi1153123	[toxic shock syndrome toxin-1 precursor [Staphylococcus aureus] pir A24606 XCSAS1 toxic shock syndrome toxin-1 precursor - Laphylococcus aureus	53	38	729
766	1	2	673	gi1687600	orfA2: orfA2 forms an operon with orfA1 [Listeria monocytogenes]	53	43	672
781	1	667	335	gi11204551	pollin biogenesis protein [Haemophilus influenzae]	53	26	333
801	1	3	545	gi11279400	SapA protein [Escherichia coli]	53	25	543
803	1	2	910	gi1693278	lipase-like enzyme [Alcaligenes eutrophus]	53	30	909
872	1	1177	590	gi1298032	EF [Streptococcus suis]	53	30	588
910	1	2	184	gi11046936	unknown [Schizosaccharomyces pombe]	53	29	183
943	1	794	399	gi1190508	similar to unidentified ORF near 47 minutes [Escherichia coli] sp P31436 Y1CK_ECOLI HYPOTHETICAL 43.5 KD PROTEIN IN SELC-NLPA HYPERGENIC REGION	53	30	396
988	1	1004	504	gi1142441	ORF 3: putative [Bacillus subtilis]	53	28	501
1064	1	3	434	gi1305080	myosin heavy chain [Entamoeba histolytica]	53	26	432
1366	1	3	452	gi1308852	transmembrane protein [Lactococcus lactis]	53	33	450
1758	1	792	397	gi11001774	hypothetical protein [Synecocystis sp.]	53	30	396
1897	1	1	447	gi11103949	YgiX [Bacillus subtilis]	53	27	447
2381	1	798	400	gi11146243	22.4% identity with Escherichia coli DNA-damage inducible protein ... putative [Bacillus subtilis]	53	37	399
3537	1	1	327	gi1450688	hsmM gene of Ecoprr1 gene product [Escherichia coli] pir S3437 S3437 hsdM protein - Escherichia coli pir S09629 S09629 hypothetical protein A - Escherichia coli (S08 40-520)	53	35	327
3747	2	137	397	gi11477486	transposase [Burkholderia cepacia]	53	53	261
11	5	3049	3441	gi1868224	[No definition line found [Caenorhabditis elegans]	52	33	393

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
15	5	2205	2369	gi 215966	Gel protein (gag start codon) (Bacteriophage T4)	52	34	165
19	3	2429	3808	gi 1205379	UDP-murac-pentapeptide synthetase (Haemophilus influenzae)	52	31	1380
24	1	6920	3462	gi 579124	predicted 86.4kd protein; 52kd observed (Mycobacteriophage J5) p1r 830971 830971 gene 26 protein - Mycobacterium phage J5 sp Q05233 VG26_BPHL5 MINOR TAIL PROTEIN OP26. (SUB 2-837)	52	32	3459
37	5	3015	3935	gi 1500543	P115 protein (Methanococcus jannaschii)	52	25	921
38	13	8795	9703	gi 46851	glucose kinase (Streptomyces coelicolor)	52	29	908
44	16	10617	11066	gi 42012	mosE gene product (Escherichia coli)	52	36	450
46	1	3	521	gi 1040957	NADH dehydrogenase subunit 6 (Anopheles trinkae)	52	25	519
51	10	5531	6280	gi 388269	trac (Plasmid pAD1)	52	32	750
56	5	3968	2826	gi 181949	endothelial differentiation protein (edg-1) (Homo sapiens) p1r A35300 A35300 G protein-coupled receptor edg-1 - human sp P21443 EDG1_HUMAN PROBABLE G PROTEIN-COUPLED RECEPTOR EDG-1.	52	23	1143
57	5	4850	4173	gi 304153	sorbitol dehydrogenase (Bacillus subtilis)	52	27	678
62	5	3364	2870	gi 1072399	lphaE gene product (Rhizobium meliloti)	52	25	495
62	6	4445	3651	gi 46485	NADH dehydrogenase (Synecococcus PCC7942)	52	27	795
67	14	11355	12962	gi 3511365	glutamate synthase (NADPH), subunit alpha (Methanococcus jannaschii)	52	30	1608
67	21	16935	18158	gi 1204393	hypothetical protein (SP-P31122) (Haemophilus influenzae)	52	25	1224
70	4	2185	1997	gi 7227	cytoplasmic dynein heavy chain (Dictyostelium discoideum) c A44357 A44357 dynein heavy chain, cytosolic - slime mold cytosolium discoideum	52	36	189
96	10	10005	10664	gi 1408485	lactG gene product (Bacillus subtilis)	52	26	660
103	5	3986	3351	gi 1009368	Respiratory nitrate reductase (Bacillus subtilis)	52	42	636
109	3	4102	3350	gi 69274	lmbE gene product (Mycobacterium leprae)	52	39	753
109	19	15732	17300	gi 1526981	amino acid permease YeeF like protein (Salmonella typhimurium)	52	30	1569
121	3	1412	981	gi 732931	unknown (Saccharomyces cerevisiae)	52	32	412
125	3	865	1680	gi 1296975	lpuT gene product (Porphyromonas gingivalis)	52	38	816
130	2	659	1807	gi 1256634	25.8% identity over 120 aa with the Synecococcus sp. MpaV protein; putative (Bacillus subtilis)	52	36	1149
149	1	1164	583	gi 1225943	lpxS terminase (Bacillus subtilis)	52	33	582
149	14	4687	4415	gi 1510368	M. jannaschii predicted coding region MJ0272 (Methanococcus jannaschii)	52	35	273

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
167	1	216	1001	gi 46025	cell division protein [Escherichia coli]	52	43	786
188	1	120	1256	gi 474915	orf 337; translated orf similarity to SW: BCR-ECOLI bicyclomycin resistance protein of Escherichia coli [Coxiella burnetii] pir[S44207/S44207] hypothetical protein 337 - Coxiella burnetii (SUB-338)	52	26	1137
195	9	9161	8760	gi 1028	mitochondrial outer membrane 72K protein [Neurospora crassa] r A3682/A3682 72K mitochondrial outer membrane protein - Neurospora crassa	52	25	402
200	3	2065	2607	gi 42439	ATP-dependent nuclease [Bacillus subtilis]	52	35	543
203	4	2776	3684	gi 1303698	BLTD [Bacillus subtilis]	52	25	909
227	8	5250	5651	gi 305080	myosin heavy chain [Entamoeba histolytica]	52	24	402
242	1	21	1424	gi 1060877	BarV [Escherichia coli]	52	32	1404
249	5	4526	4753	pir C37222 C372	cytochrome P450 1A1, hepatic - dog (fragment)	52	23	228
255	1	2107	1055	gi 143290	penicillin-binding protein [Bacillus subtilis]	52	28	1053
276	7	3963	3664	gi 1001610	hypothetical protein [Synchocystis sp.]	52	30	300
276	8	4456	4055	gi 416235	orf L3 [Mycoplasma capricolum]	52	26	402
289	2	1856	1449	gi 150900	GTP phosphohydrolase [Proteus vulgaris]	52	34	408
325	1	1	279	gi 1204874	polypeptide deformylase (formylmethionine deformylase) [Haemophilus influenzae]	52	33	279
340	1	2017	1010	gi 1215695	peptide transport system protein SapF homolog [Mycoplasma pneumoniae]	52	33	1008
375	3	340	1878	gi 467446	similar to SpoVB [Bacillus subtilis]	52	28	1539
424	4	4104	3262	gi 1478239	unknown [Mycobacterium tuberculosis]	52	34	843
430	1	3	575	pir A42606 A426	orfA 5' to orf405 - Saccharopolyspora erythraea (fragment)	52	28	573
444	4	4728	3712	gi 1408494	homologous to penicillin acylase [Bacillus subtilis]	52	31	1017
465	1	1802	903	gi 143331	alkaline phosphatase regulatory protein [Bacillus subtilis] pir A27650 A27650 regulatory protein phoR - Bacillus subtilis sp P23545 PHO_R_BACSU ALKALINE PHOSPHATASE SYNTHESIS SENSOR PROTEIN PHO R (PC 2.7.3.-)	52	36	900
469	5	4705	4169	gi 755152	highly hydrophobic integral membrane protein [Bacillus subtilis] sp P42953 TAGC_BACSU TEICHOIC ACID TRANSLOCATION PERMEASE PROTEIN AGG.	52	32	537
495	1	1262	633	gi 1204607	transcription activator [Haemophilus influenzae]	52	25	630
505	7	6004	5762	gi 142440	ATP-dependent nuclease [Bacillus subtilis]	52	28	243

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
517	2	1162	1614	gi166162	Bacteriophage phi-11 int gene activator (Staphylococcus acteriophage phi 11)	52	35	453
543	2	444	1295	gi1215693	putative orf; G9_orf434 (Mycoplasma pneumoniae)	52	25	852
586	1	1	336	gi1581648	epiB gene product (Staphylococcus epidermidis)	52	36	336
773	1	848	426	gi1278769	FdHC (Methanobacterium thermoformicicum)	52	30	423
1120	2	100	330	gi142439	ATP-dependent nuclease (Bacillus subtilis)	52	35	231
1614	1	691	347	gi1289262	comE ORF (Bacillus subtilis)	52	28	345
2495	1	1	324	gi1216151	DNA polymerase (gene L; ttg start codon) (Bacteriophage SPO2) gi1579197 SPO2 DNA polymerase (aa 1-648) (Bacteriophage SPO2) pif/A21498/DJBPS2 DNA-directed DNA polymerase (EC 2.7.7.7) - phage PO2	52	34	324
2931	1	566	285	gi1256136	YbbG (Bacillus subtilis)	52	30	282
2943	1	577	320	gi11713	hlaA ORF (AA 1-245) (Escherichia coli)	52	35	258
2993	1	588	295	gi1298032	EF (Streptococcus suis)	52	34	294
3667	1	612	307	gi1849025	hypothetical 64.7-KDa protein (Bacillus subtilis)	52	36	306
3944	1	478	260	gi1218040	BAA (Bacillus licheniformis)	52	36	219
3954	2	613	347	gi1854064	U87 (Human herpesvirus 6)	52	50	267
1986	1	90	401	gi1205919	Na ⁺ and Cl ⁻ dependent gamma-aminobutyric acid transporter (Haemophilus influenzae)	52	33	312
4002	1	3	389	gi140003	oxoglutarate dehydrogenase (NADP+) (Bacillus subtilis) p123129[DDO1_BACSU 2-OXOGLUTARATE DEHYDROGENASE E1 COMPONENT (EC 2.4.2) (ALPHA- KETOGLUTARATE DEHYDROGENASE)	52	42	387
4020	1	1	249	gi155188	ornithine decarboxylase (Leishmania donovani)	52	47	249
4098	1	438	220	gi1409795	No definition line found (Escherichia coli)	52	32	219
4248	1	3	212	gi1965077	Adrep (Saccharomyces cerevisiae)	52	40	210
7	1	3	575	gi1895747	putative cel operon regulator (Bacillus subtilis)	51	28	573
21	4	2479	3276	gi1510962	indole-3-glycerol phosphate synthase (Methanococcus jannaschii)	51	32	798
22	9	5301	5966	gi1303933	YqjN (Bacillus subtilis)	51	25	666
43	3	1516	1283	gi1519460	Srpi (Schizosaccharomyces pombe)	51	31	234
44	17	11042	11305	gi142011	mead gene product (Escherichia coli)	51	35	264
51	11	6453	6731	gi1495471	vacuolating toxin (Helicobacter pylori)	51	17	279

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
52	4	2537	2995	gi1256652	25% identity to the E. coli regulatory protein MprA; putative [Bacillus subtilis]	51	32	459
57	10	7331	6843	gi1508173	E11A domain of PTS-dependent Gat transport and phosphorylation Escherichia coli	51	32	489
59	1	29	1111	gi1299163	alanine dehydrogenase [Bacillus subtilis]	51	33	1081
67	20	15791	16576	gi11510977	M. jannaschii predicted coding region M10938 [Methanococcus jannaschii]	51	24	786
69	2	1559	1218	gi1467359	unknown [Bacillus subtilis]	51	34	342
71	1	3	1196	gi1298032	EF [Streptococcus suis]	51	32	1194
78	2	349	176	gi11161242	proliferating cell nuclear antigen [Styela clava]	51	28	174
99	4	3357	4040	gi1642795	TFIID subunit TAF1155 [Homo sapiens]	51	25	684
109	1	2852	1428	gi1580920	rodd (gtaA) polypeptide (AA 1-673) [Bacillus subtilis] pir[S06048]S06048 probable rodd protein - Bacillus subtilis sp[P13484]TAGE_MACSU PROBABLE POLY(GLYCEROL-PHOSPHATE) LPH4-GLUCOSYLTRANSFERASE (EC 2.4.1.52) (TECHOTIC ACID BIOSYNTHESIS ROYEN E1)	51	27	1425
109	9	6007	6693	gi11204815	hypothetical protein (SP:P32862) [Haemophilus influenzae]	51	23	687
112	3	1066	2352	pir[S05330]S053	maltose-binding protein precursor - Enterobacter aerogenes	51	42	1287
112	13	14432	12855	gi1405857	yehU [Escherichia coli]	51	29	1578
114	9	9725	8967	gi1435098	orf1 [Mycoplasma capricolum]	51	30	759
115	1	1	912	gi1141110	ORF YHU087w [Saccharomycus euryveliae]	51	25	912
127	10	9847	10477	gi11204314	H. influenzae predicted coding region M10056 [Haemophilus influenzae]	51	37	831
152	9	6814	7356	gi1431929	Mun1 regulatory protein [Mycoplasma sp.]	51	38	543
154	2	575	1153	gi11237044	unknown [Mycobacterium tuberculosis]	51	36	579
154	7	6587	5634	gi1409286	bmtU [Bacillus subtilis]	51	27	954
171	8	6943	6236	gi11205484	hypothetical protein (SP:P33918) [Haemophilus influenzae]	51	32	708
184	1	1	291	gi1466886	B1496_C3_206 [Mycobacterium leprae]	51	33	291
212	5	1501	2139	pir[A45605]A456	mature-parasite-infected erythrocyte surface antigen MESA - Plasmodium falciparum	51	23	639
228	2	707	1378	gi18204	nuclear protein [Drosophila melanogaster]	51	27	672
236	8	8137	7481	gi149272	Asparaginase [Bacillus licheniformis]	51	31	657
243	4	4637	3546	gi11511102	melvalonate kinase [Methanococcus jannaschii]	51	29	1092

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match	Match gene name	% sim	% ident	Length (nt)
257	4	3540	3373	gi 204579	H. influenzae predicted coding region H10326 [Haemophilus influenzae]	51	22	168
258	3	2397	1609	gi 160299	glutamic acid-rich protein [Pseudomonas fluorescens] p1r A54514 A54514 glutamic acid-rich protein precursor - Pseudomonas fluorescens	51	34	789
265	5	2419	3591	gi 580841	PI [Bacillus subtilis]	51	32	1173
298	2	518	748	gi 1336162	SCP8 [Streptococcus agalactiae]	51	34	231
316	9	5817	7049	gi 413953	lpa-29d gene product [Bacillus subtilis]	51	39	1233
332	2	3775	2057	gi 1209012	mucS [Thermus aquaticus thermophilus]	51	26	1719
364	4	3816	4991	gi 528991	unknown [Bacillus subtilis]	51	32	1176
440	2	448	684	gi 12819	transferase (GAL10) (AA 1 - 687) [Kluyveromyces fragilis] r S01407 XUVK UDP-glucose 4-epimerase (EC 5.1.3.2) - yeast Uveromyces fragilis var. lactis	51	32	237
495	2	1353	1177	gi 297861	protease G [Erwinia chrysanthemi]	51	41	177
495	3	2287	1718	gi 151317	serine rich protein [Entamoeba histolytica]	51	25	570
506	1	840	421	gi 455320	clp protein [Bacteriophage P4]	51	33	420
600	1	1474	983	gi 587532	orf. len: 201, CAT: 0.16 [Saccharomyces cerevisiae] p1r S48818 S48818 hypothetical protein - yeast [Saccharomyces cerevisiae]	51	30	492
607	3	479	934	gi 1511524	hypothetical protein (SP-P37002) [Methanococcus jannaschii]	51	40	456
686	2	127	600	gi 493017	endocarditis specific antigen [Enterococcus faecalis]	51	30	474
726	1	33	210	gi 1353851	unknown [Prochlorococcus marinus]	51	45	198
861	1	176	652	gi 410145	dehydroquinase dehydratase [Bacillus subtilis]	51	34	477
869	1	782	393	gi 40100	rodC (tag) polypeptide (AA 1-746) [Bacillus subtilis] r S06049 S06049 rodC protein - Bacillus subtilis p1r P13485 TAGF_BACSU TECHNOIC ACID BIOSYNTHESIS PROTEIN F.	51	23	390
1003	1	642	322	gi 1279707	hypothetical phosphoglycerate mutase [Saccharomyces cerevisiae]	51	39	321
1046	2	866	624	gi 510257	glycosyltransferase [Escherichia coli]	51	29	243
1467	1	702	352	gi 1511175	M. jannaschii predicted coding region M3177 [Methanococcus jannaschii]	51	32	351
2558	1	457	210	isp10582 DPOH	DNA POLYMERASE (EC 2.7.7.7) (S-1 DNA ORF 3).	51	26	228
3003	1	779	399	gi 809543	[CbrC protein [Erwinia chrysanthemi]	51	27	381
3604	1	1	399	gi JC4210 JC42	[3-hydroxyacyl-CoA dehydrogenase (EC 1.1.1.35) - mouse	51	37	399
3732	1	2	316	gi 145906	acyl-CoA synthetase [Escherichia coli]	51	33	315

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
3791	1	2	274	gi 1061351	semaphorin III family homolog (Homo sapiens)	51	37	273
3995	1	46	336	gi 216346	surfactin synthetase (Bacillus subtilis)	51	38	291
4193	1	612	307	gi 42749	ribosomal protein L12 (AA 1-179) (Escherichia coli) r1504776 XMECP1 peptide N-acetyltransferase rimM (EC 2.3.1.-) - chetichia coli	51	25	306
4539	1	367	185	gi 1408494	homologous to penicillin acylase (Bacillus subtilis)	51	40	183
4562	1	442	239	gi 1458280	coded for by C. elegans cDNA cm01e7; Similar to hydroxymethylglutaryl-CoA synthase (Caenorhabditis elegans)	51	35	204
1	4	3576	4859	gi 559160	GBA10 score: null; cap site and late promoter motifs present upstream; putative Autographa californica nuclear polyhedrosis virus	50	44	1284
11	7	4044	5165	gi 1146207	putative (Bacillus subtilis)	50	35	1122
11	113	10509	9496	gi 1208451	hypothetical protein (Symbiobacterium sp.)	50	39	1014
19	1	2034	1018	gi 411966	ipa-42d gene product (Bacillus subtilis)	50	29	1017
20	111	8586	8407	gi 1323159	ORF YGR103W (Saccharomyces cerevisiae)	50	28	180
24	5	5408	4824	gi 496280	structural protein (Bacteriophage Tuc2009)	50	29	585
34	4	1926	2759	gi 1303966	(Yqj0 (Bacillus subtilis)	50	36	834
38	30	22865	23440	gi 1072179	Similar to dihydroflavonol-4-reductase (maize, petunia, tomato) (Caenorhabditis elegans)	50	32	576
47	2	1705	2876	gi 153015	PemA protein (Staphylococcus aureus)	50	29	1272
56	13	15290	15841	gi 806096	ORF_1167; end overlaps end of 0100 by 14 bases; start overlaps 174, then starts possible (Escherichia coli)	50	30	552
57	1	2135	1077	gi 640922	xylitol dehydrogenase (unidentified hemiascomycete)	50	29	1059
58	2	628	1761	gi 143725	putative (Bacillus subtilis)	50	29	1134
88	6	4193	3884	gi 1072179	Similar to dihydroflavonol-4-reductase (maize, petunia, tomato) (Caenorhabditis elegans)	50	32	510
89	5	3700	3356	gi 1276658	ORF174 gene product (Porphyra purpurea)	50	25	345
141	1	3	239	gi 476024	carbamoyl phosphate synthetase II (Plasmodium falciparum)	50	33	237
151	1	186	626	gi 1403641	unknown (Mycobacterium tuberculosis)	50	35	441
166	7	11065	9623	gi 1895747	putative cel operon regulator (Bacillus subtilis)	50	32	1443
201	6	5284	5096	gi 160229	circumsporozoite protein (Plasmodium relictum)	50	42	189
206	22	30784	29555	gi 1052754	LarP integral membrane protein (Lactococcus lactis)	50	24	1230

TABLE 2

S aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
211	4	1523	1927	gi 410131	ORF7 [Bacillus subtilis]	50	29	405
214	4	2411	3295	sp P37348 VECE_	HYPOTHETICAL PROTEIN IN ASP5 5' REGION (FRAGMENT)	50	37	885
228	7	5088	4406	gi 313580	envelope protein [human immunodeficiency virus type 1] p17[535835]535835 envelope protein - human immunodeficiency virus type 1 (fragment) (SUB 1-71)	50	35	663
272	2	3048	1723	gi 1408485	B65G gene product [Bacillus subtilis]	50	22	1326
273	2	1616	984	gi 184186	phosphoglycerate mutase [Saccharomyces cerevisiae]	50	28	633
328	2	2507	1605	gi 148896	lipoprotein [Haemophilus influenzae]	50	26	903
332	4	5469	3802	gi 1526547	DNA polymerase family X [Thermus aquaticus]	50	27	1668
342	5	3473	3931	gi 456362	G-box binding factor [Dictyostelium discoideum]	50	35	459
352	1	1478	741	gi 288301	ORF2 gene product [Bacillus megaterium]	50	29	738
408	7	2299	5523	gi 11665	ORF2136 [Marchantia polymorpha]	50	27	225
420	3	650	1825	gi 1757842	UDP-sugar hydrolase [Escherichia coli]	50	30	1176
464	1	1	591	gi 487282	NA ⁺ -ATPase subunit J [Enterococcus hirae]	50	29	591
472	2	1418	864	gi 551875	BglR [Lactococcus lactis]	50	23	555
520	1	23	541	gi 567036	CapE [Staphylococcus aureus]	50	27	519
529	1	6	410	gi 1256652	25% identity to the E.coli regulatory protein MprA; putative [Bacillus subtilis]	50	34	405
534	5	7726	6059	gi 1295671	selected as a weak suppressor of a mutant of the subunit AC40 of DNA dependent RNA polymerase I and III [Saccharomyces cerevisiae]	50	18	1668
647	1	2990	1497	gi 405568	TraI protein shares sequence similarity with a family of topoisomerases [Plasmid pSK41]	50	31	1494
664	3	1133	711	gi 410007	leukocidin F component [Staphylococcus aureus, MRSA No. 4, Peptide, 23 aa]	50	32	423
678	1	1	627	gi 128032	EF [Streptococcus suis]	50	29	627
755	3	947	1171	gi 150572	cytochrome c1 precursor (EC 1.10.2.2) [Paracoccus denitrificans] gi 45465 cytochrome c1 (AA 1-450) [Paracoccus denitrificans] p17[C39413]C39413 ubiquinol--cytochrome-c reductase (EC 1.10.2.2) cytochrome c1 precursor - Paracoccus denitrificans sp P1627 CY1	50	37	225
827	1	1363	683	gi 142020	heterocyst differentiation protein [Anabaena sp.]	50	21	681
892	1	3	752	gi 408485	B65G gene product [Bacillus subtilis]	50	27	750
910	2	418	887	gi 104727	cytosine-specific transport protein [Haemophilus influenzae]	50	25	450

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
933	1	524	gi1205451	cell division inhibitor (Haemophilus influenzae)	50	32	217
973	1	424	gi1886947	orf3 gene product (Saccharomyces cerevisiae)	50	40	189
1009	1	653	gi1153727	M protein (group G streptococcus)	50	28	225
1027	1	511	gi1413934	lipa-10r gene product (Bacillus subtilis)	50	25	255
1153	2	556	gi1773676	inCCA (Alcaligenes xylosoxydans)	50	36	231
1222	1	798	gi11408485	B65G gene product (Bacillus subtilis)	50	21	399
1350	1	692	gi1289272	lactochrome-binding protein (Bacillus subtilis)	50	32	294
2945	1	366	gi1171704	hexaprenyl pyrophosphate synthetase (COQ1) (Saccharomyces erevisiae)	50	34	183
2968	2	1604	gi1197526	clumping factor (Staphylococcus aureus)	50	33	801
2998	2	657	gi1495696	PSA47.3 gene product (Caenorhabditis elegans)	50	40	264
3026	2	306	gi1513819	acyl carrier protein - Anabaena variabilis (fragment)	50	32	201
3063	1	547	gi1174190	lucA gene product (Escherichia coli)	50	29	273
3174	1	3	gi1151900	alcohol dehydrogenase (Rhodobacter sphaeroides)	50	31	144
3792	1	625	gi11001423	hypothetical protein (Synecocystis sp.)	50	35	312
3800	1	262	gi1144733	NAD-dependent beta-hydroxybutyryl coenzyme A dehydrogenase Clostridium acetobutylicum	50	28	261
3946	1	373	gi1576765	cytochrome b (Myrmecia pilosula)	50	38	186
3984	1	578	gi157348	HYPOTHEICAL PROTEIN IN ASP5 5' REGION (FRAGMENT)	50	37	288
37	10	8250	gi11204367	hypothetical protein (CB-U14003.278) (Haemophilus influenzae)	49	30	366
46	16	13802	gi1466860	lact: B1308_F1_34 (Mycobacterium leprae)	49	24	1047
59	5	2267	gi1606304	ORF_0462 (Escherichia coli)	49	27	1335
112	18	17884	gi1559502	ND4 protein (AA 1 - 409) (Caenorhabditis elegans)	49	25	732
138	9	6973	gi1303953	esterase (Acinetobacter calcoaceticus)	49	29	930
217	6	4401	gi1496254	fibrinectin/fibrinogen-binding protein (Streptococcus pyogenes)	49	31	738
220	12	11803	gi1397526	clumping factor (Staphylococcus aureus)	49	31	855
228	4	1842	gi1521692	hypothetical protein 9 - Plasmodium falciparum	49	24	651
268	1	5016	gi143047	ORF8 (Bacillus subtilis)	49	26	2403

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
271	2	1184	1373	gi11001257	hypothetical protein [Synecocystis sp.]	49	38	210
300	3	4340	3180	gi11510796	hypothetical protein [OP-X91086.2] [Methanococcus jannaschii]	49	26	1161
381	1	2281	1142	gi1396301	matches PS00041: Bacterial regulatory proteins, araC family ignature [Escherichia coli]	49	29	1140
466	1	3	947	gi11303863	Yggp [Bacillus subtilis]	49	26	945
666	1	379	191	gi1633112	ORF1 [Streptococcus sobrinus]	49	29	189
670	2	403	1014	gi11122758	unknown [Bacillus subtilis]	49	32	612
709	1	1431	795	gi1143830	mpaC [Bacillus subtilis]	49	29	639
831	1	943	473	gi1401786	phosphonotransferase [Mycoplasma pirum]	49	29	471
1052	1	422	213	gi11303799	Yqen [Bacillus subtilis]	49	21	210
1800	1	342	172	gi1216300	peptidoglycan synthetase [Bacillus subtilis] sp137585 [MURC-BACSU MURC PROTEIN UPD-N-ACETYLGLUCOSAMINE--N-ACETYLGLUCOSAMINE TRANSFERASE]. PENTAPEPTIDE/PHOSPHORYL-UNDECAPEPTOL N-ACETYLGLUCOSAMINE TRANSFERASE).	49	28	171
2430	1	3	376	sp127434 YFCA	HYPOTHETICAL 36.2 KD PROTEIN IN NDR-GCPE INTERGENIC REGION.	49	26	375
3096	1	542	273	gi1516360	surfactin synthetase [Bacillus subtilis]	49	25	270
32	4	3771	3100	gi11217963	hepatocyte nuclear factor 4 gamma [HNF4gamma] [Homo sapiens]	48	36	672
38	1	1	609	gi11205790	H. influenzae predicted coding region H11555 [Haemophilus influenzae]	48	28	609
45	6	5021	6427	gi11534267	unknown [Mycobacterium tuberculosis]	48	20	1407
59	14	16346	31096	gi11197336	lump1 protein [Mycoplasma hominis]	48	28	14751
61	1	3	608	gi11511555	quinolone resistance nora protein protein [Methanococcus jannaschii]	48	30	606
61	3	3311	3646	gi1303893	Yqnl [Bacillus subtilis]	48	29	336
114	1	98	415	gi1671708	su(s) homolog: similar to Drosophila melanogaster suppressor of able (su(s)) protein, Swiss-Prot Accession Number P22293 [Drosophila virilis]	48	25	318
121	1	1131	610	gi11314584	unknown [Sphingomonas 588]	48	29	522
136	1	2014	1280	gi11205968	H. influenzae predicted coding region H11738 [Haemophilus influenzae]	48	23	735
171	10	8220	9557	gi11208454	hypothetical protein [Synecocystis sp.]	48	34	1338
175	1	3425	1814	gi1396400	similar to eukaryotic Na+/H+ exchanger [Escherichia coli] sp132703 YJCE_ECOLI HYPOTHETICAL 60.5 KD PROTEIN IN SOXR-ACS INTERGENIC REGION (0549).	48	29	1812
194	1	2	385	gi11510493	H. jannaschii predicted coding region MJ0419 [Methanococcus jannaschii]	48	25	384

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Position	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
197	1	901	452	gi 1045714	[spermidine/putrescine transport ATP-binding protein [Mycoplasma genitalium]	48	25	450
203	1	1	396	gi 940288	[protein localized in the nucleoli of pea nuclei; ORF; putative Pisum sativum]	48	29	396
204	1	1163	698	gi 529202	[No definition line found [Caenorhabditis elegans]	48	25	666
206	20	14815	27760	gi 511490	[ornithine decarboxylase 2 [Bacillus brevis]	48	27	7056
212	1	2	166	gi 295899	[nucleolin [Xenopus laevis]	48	34	165
220	10	12652	11426	gi 44073	[Sect protein [Lactococcus lactis]	48	23	1227
243	6	6450	5491	gi 1184118	[mevalonate kinase [Methanobacterium thermoautotrophicum]	48	30	960
264	4	5434	3308	gi 1015903	[ORF YJR15C [Saccharomyces cerevisiae]	48	26	2127
441	1	1532	768	gi 162863	[replication initiation protein [Bacillus subtilis] pir B24580 B24580 replication initiation protein - Bacillus subtilis]	48	23	765
444	5	3898	5298	gi 145836	[putative [Escherichia coli]	48	24	1403
484	2	368	1110	gi 146551	[transmembrane protein (kdp) [Escherichia coli]	48	18	723
542	3	1425	2000	pir 528969 5289	[N-carbamoylserine amidohydrolase (EC 3.5.1.59) - Arthrobacter sp.	48	27	576
566	1	1	1019	gi 153490	[tetracycline C resistance and export protein [Streptomyces laevis]	48	24	1017
611	1	2	730	gi 1103507	[unknown [Schizosaccharomyces pombe]	48	38	729
624	1	1255	665	gi 144859	[ORF B [Clostridium perfringens]	48	26	591
846	1	1014	508	gi 537506	[paramyosin [Drosophila melanogaster]	48	27	507
1020	1	66	950	gi 1499876	[magnesium and cobalt transport protein [Methanococcus jannaschii]	48	30	845
1227	1	1	174	gi 493730	[lipoygenase [Pisum sativum]	48	35	174
1266	1	1	405	gi 1882452	[ORF f211; alternate name ysgA; orf5 of X14436 [Escherichia coli] gi 41425 ORF5 (AA 1-197) [Escherichia coli] (SUB 15-211)]	48	24	405
2071	1	707	381	gi 1408486	[HS74A gene product [Bacillus subtilis]	48	25	327
2198	1	463	233	gi 1500401	[reverse gyrase [Methanococcus jannaschii]	48	40	231
2425	1	476	246	pir H48563 H485	[Cl protein - footpox virus (strain HP444) (fragment)]	48	40	231
2432	1	446	225	gi 1353703	[Trlo [Homo sapiens]	48	33	222
2453	1	784	399	gi 142850	[division initiation protein [Bacillus subtilis]	48	29	396
2898	1	469	236	gi 577569	[PepV [Lactobacillus delbrueckii]	48	31	234

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
3042	1	14	280	gi 945219	mucin [Homo sapiens]	48	35	267
3886	1	1	405	gi 145836	putative [Escherichia coli]	48	25	405
4027	2	492	301	pir.S51177 S511	trans-activator protein - Equine infectious anemia virus	48	32	192
4	2	3641	2232	gi 1103989	YqkI [Bacillus subtilis]	47	24	1410
24	2	599	1084	gi 540083	PCT-1 gene product [Bradyzia hygidai]	47	28	486
36	10	7524	6925	gi 1209223	esterase [Acinetobacter lwoellii]	47	26	600
43	2	196	1884	gi 1403455	unknown Mycobacterium tuberculosis	47	27	1689
44	22	11618	15108	gi 1511555	quinolone resistance norA protein protein [Methanococcus jannaschii]	47	31	1011
69	7	7141	6710	gi 438466	possible operon with orfG. Hydrophilic, no homologue in the database; putative [Bacillus subtilis]	47	29	432
81	4	5022	4279	gi 466882	ppa1; B1496_C2_189 [Mycobacterium leprae]	47	24	744
120	12	9135	8863	gi 927340	D9509.27p; CAI: 0.12 [Saccharomyces cerevisiae]	47	38	273
142	1	2022	1174	gi 486143	ORF VKL094w [Saccharomyces cerevisiae]	47	32	849
168	1	2178	1093	gi 1177254	hypothetical EcSB protein [Bacillus subtilis]	47	29	1086
263	1	1884	943	gi 1142822	D-alanine racemase cds [Bacillus subtilis]	47	34	942
279	1	1109	561	gi 516608	2 predicted membrane helices, homology with B. subtilis man Orf3 Rowland et. al. unpublished Accession number M741831, approximately 1 minutes on updated Radd map; putative [Escherichia coli] sp P37355 VFBB_EC0L3	47	31	549
				HYPOHETICAL 26.7 KD PROTEIN IN MEND-MEND				
345	2	2620	1676	gi 1204835	hippuricase [Haemophilus influenzae]	47	28	945
389	2	352	400	gi 456562	IC-box binding factor [Dictyostellum discoideum]	47	32	249
391	1	1	831	gi 1420856	myo-inositol transporter [Schizosaccharomyces pombe]	47	19	831
404	3	2072	2773	gi 1255425	C33C8.2 gene product [Caenorhabditis elegans]	47	17	702
529	5	2145	3107	gi 1303973	YqjV [Bacillus subtilis]	47	29	963
565	2	2331	1257	gi 142824	processing protease [Bacillus subtilis]	47	28	1065
654	1	962	483	gi 243353	ORF 5' of ECRF [herpesvirus salmisi HVS, host-squirrel monkey, eptide, 407 aa]	47	23	480
692	1	115	633	gi 150756	140 kDa protein [Plasmid pJH1]	47	25	519
765	1	1634	819	gi 1256621	26.7% of identity in 165 aa to a thermophilic bacterium hypothetical protein 6; putative [Bacillus subtilis]	47	28	816

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	Match accession	Match gene name	% sim	% ident	length (nt)
825	2	211	1023	gi 197526	clumping factor [Staphylococcus aureus]	47	32	813
914	1	1	615	gi 558073	polymorphic antigen [Plasmodium falciparum]	47	28	615
1076	1	1	753	gi 1147557	aspartate aminotransferase [Bacillus circulans]	47	33	753
1351	1	791	398	gi 755153	ATP-binding protein [Bacillus subtilis]	47	20	396
4192	1	3	293	gi 145836	putative [Escherichia coli]	47	24	291
5	6	4708	4361	gi 305080	myosin heavy chain [Entamoeba histolytica]	46	30	348
11	4	2777	3058	gi 603639	Yel040p [Saccharomyces cerevisiae]	46	28	282
46	11	10518	10300	gi 1246901	ATP-dependent DNA ligase [Candida albicans]	46	28	219
61	4	3941	7930	gi 298032	EF [Streptococcus suis]	46	35	3970
132	4	5028	4093	gi 1511057	hypothetical protein SP:45869 [Methanococcus jannaschii]	46	25	916
170	4	4719	3652	pir 551910 SS19	C4 protein - Sauroleishmania tarentolae	46	26	1068
191	7	5543	8284	gi 1041334	F54D5.7 [Caenorhabditis elegans]	46	25	1260
253	1	1	396	gi 1204449	dihydroliipoamide acetyltransferase [Haemophilus influenzae]	46	35	396
264	3	437	973	gi 180189	cerebellar-degeneration-related antigen (CDR34) [Homo sapiens]	46	29	517
				pir A29770 A29770	cerebellar degeneration-related protein - human			
273	1	485	285	gi 607573	envelope glycoprotein C2V3 region [Human immunodeficiency virus type 1]	46	35	201
350	1	3	563	gi 537052	ORF_2286 [Escherichia coli]	46	35	561
384	1	2	862	gi 1221884	[urea7] amidolyase [Haemophilus influenzae]	46	31	861
410	4	1876	2490	gi 1110518	proton antiporter efflux pump [Mycobacterium smegmatis]	46	24	615
432	1	2663	1455	gi 1197634	orf4; putative transporter; Method: conceptual translation supplied by author [Mycobacterium smegmatis]	46	27	1209
458	1	2419	1211	gi 15470	portal protein [Bacteriophage SPPI]	46	30	1209
517	5	2477	4192	gi 1523812	orf5 [Bacteriophage A2]	46	23	1716
540	3	1512	1285	gi 215635	peaA [Bacteriophage P1]	46	30	228
587	2	649	1242	gi 537148	ORF_181 [Escherichia coli]	46	29	594
1218	1	747	391	gi 1205456	single-stranded-DNA-specific exonuclease [Haemophilus influenzae]	46	30	357

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
3695	1	1	402	gi 450688	hscdm gene of EcoPr1 gene product [Escherichia coli] pir S38437 S38437 hscdm protein - Escherichia coli pir S09629 S09629 hypothetical protein A - Escherichia coli (SUB 40-520)	46	33	402
4176	1	673	338	gi 511460	PFIM-C.1 gene product (Xenopus laevis)	46	31	336
37	7	4813	5922	gi 606064	ORF_608 [Escherichia coli]	45	24	1110
38	16	11699	12004	gi 452192	protein tyrosine phosphatase (PTP-BAS, type 2) [Homo sapiens]	45	24	306
87	2	1748	2407	gi 1064813	homologous to sp.PH08_BACSU [Bacillus subtilis]	45	23	660
103	12	14182	13385	gi 1001307	hypothetical protein (Synchocystis sp.)	45	22	798
112	14	14791	13811	gi 1204389	H. influenzae predicted coding region H10131 [Haemophilus influenzae]	45	23	981
145	4	4483	3461	gi 220578	open reading frame [Mus musculus]	45	20	1023
170	6	6329	4965	gi 238657	AppC-cytochrome d oxidase, subunit 1 homolog [Escherichia coli, K12, eptidu, 514 aa]	45	27	1365
206	2	5230	4346	gi 1222056	aminotransferase [Haemophilus influenzae]	45	27	885
228	1	60	716	gi 160299	glutamic acid-rich protein [Plasmodium falciparum] pir A34514 A34514 glutamic acid-rich protein precursor - Plasmodium falciparum	45	23	657
288	1	2	1015	gi 1255425	C33C8.2 gene product [Caenorhabditis elegans]	45	23	1014
313	3	4339	3128	gi 581140	NADH dehydrogenase [Escherichia coli]	45	30	1212
332	1	914	459	gi A70966	P47A4.2 [Caenorhabditis elegans]	45	20	456
344	1	3	221	gi 171225	kinesin-related protein [Saccharomyces cerevisiae]	45	26	219
441	2	1501	1073	gi 142863	replication initiation protein [Bacillus subtilis] pir B26580 B26580 replication initiation protein - Bacillus subtilis	45	27	429
672	1	2	982	gi 1511334	M. Jannaschii predicted coding region MJ1323 [Methanococcus jannaschii]	45	22	981
763	3	1345	851	gi 606180	ORF_310 [Escherichia coli]	45	24	495
886	3	379	846	gi 726426	similar to protein kinases and C. elegans proteins F37C12.8 and J7C12.5 [Caenorhabditis elegans]	45	30	468
948	1	3	473	gi 156400	myosin heavy chain (isozyme unc-54) [Caenorhabditis elegans] pir A3958 A3958 myosin heavy chain B - Caenorhabditis elegans sp P03566 MYSB_CAEEL MYOSIN HEAVY CHAIN B (MHC B)	45	25	471
1158	1	2	376	gi 144155	transmission-blocking target antigen [Plasmodium falciparum]	45	35	375
2551	1	4	285	gi 1276705	ORF287 gene product [Porphyra purpurea]	45	28	282
3967	1	42	374	gi 1976025	HraA [Escherichia coli]	45	28	333

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start	Stop	match	accession	match gene name	% sim	% ident	length (nt)
52	7	6931	5846	gi1467378		unknown [Bacillus subtilis]	44	22	1086
138	8	6475	6849	gi173028		thioredoxin II [Saccharomyces cerevisiae]	44	28	375
223	5	7032	5617	gi153490		tetracenomycin C resistance and export protein [Streptomyces lauecensis]	44	21	1416
252	2	1331	1122	gi1204989		hypothetical protein (GB:U00022.9) [Haemophilus influenzae]	44	30	210
263	2	3265	2093	gi1136221		carboxypeptidase [Sulfolobus solfataricus]	44	26	1173
365	4	4963	3524	gi1296822		orf1 gene product [Lactobacillus helveticus]	44	31	1440
543	3	1315	1433	gi1063250		low homology to p20 protein of Bacillus licheniformis and bleomycin acetyltransferase of Streptomyces verticillus [Bacillus subtilis]	44	24	519
544	4	3942	4892	gi1951460		FTM-C-1 gene product [Xenopus laevis]	44	32	951
792	1	1224	613	gi1205680		high molecular weight neurofilament [Rattus norvegicus]	44	28	612
48	18	11303	11911	gi1511614		molybdopterin-guanine dinucleotide biosynthesis protein A [Methanococcus jennaschii]	43	27	609
59	8	3665	5128	gi1153490		tetracenomycin C resistance and export protein [Streptomyces lauecensis]	43	21	1464
59	10	5536	7527	gi153022		lipase [Staphylococcus epidermidis]	43	22	1992
99	1	1346	681	gi11419051		unknown [Mycobacterium tuberculosis]	43	21	666
110	8	9402	12134	gi1397526		clumping factor [Staphylococcus aureus]	43	21	2733
312	3	2782	2303	gi1460540		sporozite surface protein 2 - plasmodium yoelii (fragment)	43	29	480
519	3	2547	3122	gi1006530		SULFIDE DEHYDROGENASE (FLAVOCYTOCHROME C) FLAVOPROTEIN CHAIN PRECURSOR (EC 1.8.2.-1) (FC) (FCSO)	43	23	576
4	13	12053	13321	gi1295671		selected as a weak suppressor of a mutant of the subunit AC10 of DNA dependent RNA polymerase I and III [Saccharomyces cerevisiae]	42	18	1269
94	2	1768	1091	gi1501027		ORF2 [Trypanosoma brucei]	42	31	678
127	4	5791	4550	gi142029		ORF1 gene product [Escherichia coli]	42	21	1242
297	3	1515	1036	gi142790		ORF1; putative [Bacillus firmus]	42	25	480
144	6	4097	3525	gi140320		ORF 2 (AA 1-203) [Bacillus thuringiensis]	42	30	573
512	1	2167	1115	gi1405957		lyeF [Escherichia coli]	42	23	1053
631	1	2434	1223	gi1380920		rodD (gtaA) polypeptide (AA 1-673) [Bacillus subtilis] pi[S06048]S06048 probable rodD protein - Bacillus subtilis sp[13484]PAGE_BACSU PROBABLE POLY (GLYCEROL-PHOSPHATE) LPHA-GLUCOSYLTRANSFERASE (EC 2.4.1.52) [TECHNOIC ACID BIOSYNTHESIS PROTEIN E]	42	24	1212

TABLE 2

S. aureus - Putative coding regions of novel proteins similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)	match accession	match gene name	% sim	% ident	length (nt)
685	1	2359	1739	gi 1303784	YqoD [Bacillus subtilis]	42	19	621
4132	1	787	395	gi 1022910	protein tyrosine phosphatase [Dictyostelium discoideum]	42	25	393
86	2	1375	884	gi 309506	spermidine/spermine N1-acetyltransferase [Mus saxicola] pir[S43430]S43430	41	30	492
					spermidine/spermine N1-acetyltransferase - spiny ouse [Mus saxicola]			
191	12	14797	14075	gi 1124957	orf4 gene product [Methanosarcina barkeri]	41	22	723
212	6	2150	3127	gi 115873	observed 35.2kd protein [Mycobacteriophage 15]	41	26	978
213	3	1263	2000	gi 633692	TrsA [Versinia enterocolitica]	41	18	738
408	4	2625	3386	gi 1197634	orf4: putative transporter; Method: conceptual translation supplied by author [Mycobacterium smegmatis]	41	24	762
542	1	3	1103	gi 457146	rhostry protein [Plasmodium yoelii]	41	21	1101
924	1	2	475	gi 1JH0168 JH01	nucleolin - rat	41	30	474
1562	1	1	402	gi 552184	asparagine-rich antigen Pf35-2 [Plasmodium falciparum] pir[S27826]S27826	40	20	402
					asparagine-rich antigen Pf35-2 - Plasmodium falciparum (fragment)			
2395	1	518	261	pir[S42251]S422	hypothetical protein 5 - fowlpox virus	40	18	258
4077	1	3	305	gi 1055055	coded for by C. elegans cDNA YK3791.5; coded for by C. elegans cDNA YK5C9.5; coded for by C. elegans cDNA YK1A9.5; alternatively spliced form of F32C9.8b [Caenorhabditis elegans]	39	21	303
918	1	1003	503	gi 1255425	[C3308.2 gene product [Caenorhabditis elegans]	37	25	501
59	12	8294	10636	gi 535260	STARP antigen [Plasmodium reichenowi]	36	24	2143
63	5	3550	8079	gi 298032	EF [Streptococcus suis]	36	19	4530
544	3	2507	3601	gi 1015903	OMF YJRI5C [Saccharomyces cerevisiae]	35	22	1095
63	4	1949	3574	gi 552195	Circumsporozoite protein [Plasmodium falciparum] sp P05691 CSP_PLAFL	32	27	1626
					CIRCUMSPOROZOITE PROTEIN (CS) (FRAGMENT)			

TABLE 2

TABLE 3

S. aureus - Putative coding regions of novel proteins not similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)
4	1	1234	692
4	3	1712	2278
4	4	3703	3032
4	14	113073	12585
5	2	2539	1801
5	3	1532	1771
5	7	4741	4550
5	9	7939	6422
5	12	8711	8547
6	4	2359	1982
6	1	349	176
11	8	5144	5983
11	9	5968	6498
11	10	6472	6284
11	16	10954	11271
12	5	5352	4942
12	6	4596	4862
15	3	1895	1650
16	10	11263	10835
18	2	1093	917
20	9	9125	7764
20	10	8571	8230
20	12	9201	8803
20	13	12158	10470
23	1	674	339
23	6	6138	5485
23	8	6376	5942

TABLE 3

S. aureus - Putative coding regions of novel proteins not similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)
23	9	7651	6881
23	15	12618	12830
24	4	4556	4185
24	6	5642	5241
25	2	1824	2402
31	2	505	849
31	3	1177	1524
31	4	2454	3005
32	2	765	1388
32	9	7952	8575
32	10	8591	8728
32	11	9738	9379
32	12	10797	10087
34	2	1315	1049
36	7	5226	5801
36	11	7575	7261
36	12	7424	7621
37	4	3158	2964
38	2	1585	980
38	11	6425	6868
38	20	116982	116371
38	26	120253	120804
38	27	120722	121264
39	1	1	627
40	1	805	404
43	1	796	428
44	4	2676	2324

TABLE 3

S. aureus - Putative coding regions of novel proteins not similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)
44	5	2484	3263
44	14	10587	10129
44	20	13724	13536
44	21	13596	13994
45	7	6575	6297
46	8	6365	6520
46	12	10449	10976
46	17	15032	15424
47	1	288	1079
48	9	7620	7778
50	1	1612	962
50	2	1621	1316
51	1	738	370
51	5	2520	2245
53	1	442	287
53	7	6705	6319
54	7	9014	8709
55	1	592	326
55	3	1052	786
56	1	1	261
56	3	1551	1228
56	4	1970	1560
56	17	19092	18712
57	4	3694	3521
57	8	5436	5822
58	9	8885	8553
59	3	1366	1509

TABLE 3

S. aureus - Putative coding regions of novel proteins not similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)
58	6	3026	2802
59	7	3770	3570
59	9	4946	4563
59	11	7518	8378
59	13	10401	11403
62	2	2696	1521
62	11	5440	5757
63	1	1	336
67	1	900	1781
67	2	1774	2610
67	3	2591	3904
67	8	7110	6955
68	1	78	326
70	6	6761	5199
70	11	8935	8645
77	3	1590	1192
79	2	1509	1228
79	3	1411	1791
83	1	2	403
85	9	8300	8653
85	10	8969	8781
86	3	1426	1232
87	8	9187	9366
88	3	1620	1922
89	1	3	161
89	7	5042	4878
91	1	1098	550

TABLE 3

S. aureus - Putative coding regions of novel proteins not similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)
91	3	3938	3141
92	2	449	928
92	3	1958	1467
92	9	5638	6024
94	1	661	332
94	3	2445	1813
94	4	2583	2197
96	11	110601	11050
99	6	4672	4523
99	7	5014	4784
100	8	7658	7287
102	7	4697	4368
103	3	2496	2035
104	1	2	694
104	2	899	1277
105	1	1235	693
105	3	3233	2655
105	1	3	221
106	3	1209	1355
107	1	1081	542
109	4	4025	3651
109	13	11625	11996
109	14	11981	12268
109	20	117401	117688
110	1	2	760
114	10	8764	9384
116	1	1	309

S. aureus - Putative coding regions of novel proteins not similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)
116	3	6273	4462
116	8	11049	9976
116	9	10313	10158
120	5	3703	3320
120	6	4270	3869
120	13	9290	9844
121	2	417	569
126	3	1090	818
127	3	2648	3196
127	5	4084	4395
131	6	6773	6438
132	2	715	1695
134	1	2	667
135	2	512	258
135	3	1124	729
138	1	3	152
138	7	6008	6463
140	1	2060	1022
140	2	2019	1513
140	5	2387	2743
142	2	1360	2388
142	7	8830	7586
143	7	7290	6502
144	1	1227	640
146	1	2	511
146	3	502	1350
146	4	3673	2540

TABLE 3

TABLE 3

S. aureus - Putative coding regions of novel proteins not similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)
146	5	2874	3071
147	1	1	319
149	11	3956	3615
149	12	4036	3785
149	13	4507	4145
149	15	4807	4610
149	16	5495	5049
149	18	5739	5491
149	21	7416	7054
149	23	9216	8521
149	24	9681	9106
149	25	10679	9897
150	2	2303	1587
154	3	1795	1508
154	8	6586	6398
154	14	12704	12147
154	15	13531	12803
156	1	315	593
157	3	1183	2232
158	2	1471	1064
159	3	452	808
161	2	876	1808
161	6	4653	4279
161	7	4803	4540
161	8	4896	4717
161	11	5817	5638
163	2	1604	840

TABLE 3

S. aureus - Putative coding regions of novel proteins not similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)
163	5	2796	2344
163	7	2952	2647
163	9	4905	5132
164	3	1338	1147
166	3	5213	4834
168	4	2500	2868
168	5	3595	4158
170	3	2517	2777
171	2	2277	1450
171	11	12576	11125
172	1	3	278
172	2	1940	1149
173	1	1289	708
173	5	7001	6114
174	2	593	1105
175	3	2552	2890
175	5	3820	3335
175	7	4342	4506
182	4	5477	4986
184	5	6043	5702
188	2	1210	1755
188	4	2647	2994
189	6	2614	3039
190	3	1998	2564
191	1	1	153
191	2	950	669
191	10	11786	11039

TABLE 3

S. aureus - Putative coding regions of novel proteins not similar to known proteins

Contig ID	ORF ID	Start [nt]	Stop [nt]
191	11	12902	12363
192	1	91	426
195	3	2106	1932
195	5	2899	2606
198	2	1016	1591
201	1	170	625
203	2	783	1466
206	6	8930	7815
206	12	11947	11636
206	21	28208	127960
212	2	170	817
212	3	796	1167
212	7	3128	1436
212	9	3749	4075
213	1	1	705
214	2	1076	570
214	6	4064	3738
214	9	6600	6995
214	10	7864	7469
217	1	1927	965
218	1	178	657
218	3	1776	2156
220	2	1851	1169
220	3	3251	2262
220	7	8275	7208
220	8	10244	8661
220	9	11796	10216

TABLE 3

S. aureus - putative coding regions of novel proteins not similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)
221	4	3095	2613
221	9	11428	10757
226	1	3	659
226	2	2196	1459
226	3	1476	1961
227	1	2	487
227	2	460	975
227	4	1855	2121
227	5	2052	2345
227	6	4760	3768
227	9	5591	6367
228	5	2303	2877
228	6	2846	3526
233	7	3944	3762
236	2	809	579
238	2	1975	1391
239	2	1417	905
241	5	4455	4334
242	2	1677	1363
243	1	127	576
244	1	1291	647
244	2	3035	1962
245	2	1614	1258
246	1	69	215
246	4	738	1733
249	3	3906	3712
250	1	494	249

TABLE 3

S. aureus - Putative coding regions of novel proteins not similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)
254	1	1	156
256	2	956	1144
257	3	1700	3227
260	4	4906	4580
261	4	2196	2606
261	6	3214	3681
264	2	155	439
264	5	5252	4533
264	6	4739	5107
267	2	1323	931
268	4	5140	4700
272	1	862	446
272	3	1200	1439
272	9	4691	4909
272	10	6469	6035
276	4	1746	1901
278	1	224	553
278	5	3299	3448
278	7	4849	5127
285	2	551	736
288	3	1756	1950
288	5	2055	2276
289	1	2107	1055
290	2	2234	1932
291	2	332	622
291	5	1545	2051
295	3	1606	1349

TABLE 3

S. aureus - Putative coding regions of novel proteins not similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)
295	4	2728	2141
295	5	2220	2762
297	2	788	465
298	1	2	205
300	2	2380	1928
301	7	2794	2624
304	1	3	194
306	1	109	654
306	5	4036	4257
307	1	674	339
307	8	3645	3995
308	1	1	654
308	2	1120	599
308	4	2643	2332
313	2	2314	1919
314	1	10	702
316	2	982	1341
316	6	2758	3165
317	1	2	1114
317	3	4570	3458
321	6	5645	5217
321	7	6319	6140
321	8	7450	6794
322	2	827	543
326	2	165	1112
326	3	1117	1467
328	1	936	469

TABLE 3

S. aureus - Putative coding regions of novel proteins not similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)
328	5	3452	3276
329	1	3	719
329	2	781	1212
329	3	1471	1833
330	1	576	289
330	3	1447	1623
332	3	2353	2204
332	7	4971	5138
333	2	3295	3128
335	1	864	433
337	2	95	526
340	2	1658	1356
341	1	3	281
341	3	2476	3192
341	5	3618	3844
341	6	3929	4558
344	5	3197	2889
345	1	1532	768
346	2	221	592
350	3	1410	1598
352	2	2178	1765
352	3	7316	4596
352	7	7867	8404
352	8	8806	9247
352	9	10171	9854
359	1	1	546
362	1	3	656

TABLE 3

S. aureus - Putative coding regions of novel proteins not similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)
364	2	2158	1808
364	8	10974	10714
365	2	1612	1313
365	5	4680	4090
365	7	4980	6239
366	3	520	1719
367	3	906	1085
368	1	748	494
375	1	2	136
380	3	1351	1097
389	1	1	276
390	1	2	877
390	2	1373	1549
391	2	751	560
395	1	391	197
396	1	2132	1068
398	3	1344	1141
399	1	176	669
401	3	566	847
402	2	100	465
404	8	5561	5370
408	2	3507	2269
408	3	2875	2672
408	5	3524	4423
410	3	2111	1850
413	1	880	488
416	1	607	320

TABLE 3

S. aureus - Putative coding regions of novel proteins not similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)
416	2	578	847
416	3	2195	1550
417	1	3	179
417	2	161	616
420	2	786	513
422	2	357	677
431	2	856	1407
432	2	446	1084
433	1	1	417
433	3	2311	2033
434	1	942	535
434	2	2089	1235
440	1	1	450
442	2	1265	3320
443	3	1873	1520
444	1	1	696
444	7	6761	6366
451	1	940	614
453	2	896	636
453	8	3833	4786
453	9	4718	4512
453	10	4937	4731
455	1	434	219
455	2	472	930
459	1	265	687
462	1	2	247
466	2	1494	907

TABLE 3

S. aureus - Putative coding regions of novel proteins not similar to known proteins

Contig (ID)	ORF ID	Start (nt)	Stop (nt)
467	1	654	349
468	1	2	250
469	1	1488	925
469	3	2386	3372
469	4	3464	3706
470	1	77	538
470	6	4098	1698
470	7	6330	5686
470	9	7351	8181
470	10	8175	9723
471	1	940	500
471	2	1562	1017
476	1	70	267
477	1	2	760
477	3	1764	2081
477	4	2066	2332
480	5	4016	4261
481	2	956	480
486	3	613	774
487	6	1795	2112
488	1	715	359
492	1	127	675
493	1	2	520
493	2	496	1242
502	3	1149	1571
504	1	690	346
505	5	4566	4150

TABLE 3

S. aureus - Putative ending regions of novel proteins not similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)
511	2	1741	1232
512	2	583	747
515	1	609	812
517	4	2179	2511
520	4	2097	2380
520	6	3908	3669
527	1	1	498
528	1	637	315
529	2	1679	1104
530	7	5298	5534
536	1	308	156
538	1	1362	736
538	3	2203	2480
538	5	3531	3121
538	6	4348	3731
540	1	996	664
540	2	1495	1031
541	1	89	433
541	2	719	432
542	2	1048	1272
545	2	1012	734
551	1	2145	1129
555	2	892	704
558	3	1357	1154
558	4	1760	1458
558	5	2105	1821
558	6	2166	2020

TABLE 3

S. aureus - Putative coding regions of novel proteins not similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)
558	7	2636	2322
558	8	3053	2802
558	9	3986	3653
560	1	475	921
565	3	1706	1485
571	1	308	156
571	3	994	1206
577	1	2	199
577	2	163	453
579	1	1	477
579	2	1784	1200
583	1	1988	996
585	1	946	539
587	1	22	573
588	2	1896	1372
588	3	1742	1554
590	1	47	334
592	2	1455	1141
593	1	2	775
593	2	817	1122
595	1	87	890
596	3	1593	1435
602	1	8	169
603	5	1071	1469
606	1	322	768
607	5	1444	1226
610	1	1029	541

TABLE 3

S. aureus - Putative coding regions of novel proteins not similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)
612	1	3	500
616	1	991	650
617	2	736	491
622	1	36	147
625	4	2046	2549
627	1	67	210
628	1	901	452
631	3	6789	4004
634	1	1448	759
636	1	189	368
636	2	1929	1063
637	2	2323	1994
638	1	227	1081
639	1	518	261
639	2	1377	811
641	1	118	444
642	3	1615	1331
642	4	2260	1847
643	1	3	608
645	4	1534	1758
645	6	2025	2321
645	7	2940	2488
648	1	2	1045
660	1	77	601
660	2	576	872
661	1	1725	961
664	2	89	304

TABLE 3

S. aureus - Relative coding regions of novel proteins not similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)
667	1	3	413
668	1	1	330
671	2	812	516
673	1	3	338
674	2	865	584
679	1	1	237
679	3	1589	1906
686	1	1236	835
688	2	1332	1077
694	1	3	143
696	2	818	432
706	1	36	221
709	3	1183	1449
711	1	3	908
715	1	3	167
716	1	2	637
721	1	133	570
722	1	763	383
723	1	1656	829
723	2	1498	1112
727	1	2	472
729	1	268	441
731	1	130	828
735	1	2	214
736	1	3	782
738	1	2	298
742	1	3	230

TABLE 3

S. aureus - Putative coding regions of novel proteins not similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)
745	3	1148	780
748	2	282	464
749	1	685	344
751	1	901	452
755	1	97	522
755	2	520	918
758	2	663	400
764	2	1033	746
767	1	1	405
768	1	2	373
771	1	1058	534
778	1	1735	902
785	1	1790	1023
787	1	1260	631
791	1	3	224
799	1	15	260
804	1	304	711
805	1	3	680
808	1	219	842
810	1	2221	1112
810	2	1774	1442
812	1	38	979
817	1	714	358
818	2	487	1104
819	2	1529	1032
819	3	1748	1419
820	1	195	1064

TABLE 3

S. aureus - Putative coding regions of novel proteins not similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)
828	1	506	255
829	1	48	800
830	1	578	291
832	1	594	298
835	1	320	796
840	3	491	709
845	1	912	457
850	2	303	449
853	1	715	359
860	1	2	256
864	1	18	410
864	2	383	715
864	6	1676	1828
870	1	1	586
873	1	906	454
875	1	584	294
877	1	1661	1020
878	1	981	544
879	1	1567	785
881	1	1	283
882	1	389	604
890	1	2	508
905	1	793	398
906	1	852	544
912	1	373	188
913	1	3	290
913	2	1092	547

TABLE 3

S. aureus - Putative coding regions of novel proteins not similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)
915	1	6	181
915	2	169	402
921	1	126	386
927	1	1578	808
928	1	2	385
929	1	2	400
932	1	2	400
934	1	1	384
936	1	1052	528
937	1	2	616
945	1	220	645
945	2	649	1242
946	1	1702	950
949	1	1	270
951	1	3	362
955	1	3	143
960	1	723	400
963	1	1	162
965	1	690	346
966	1	1079	606
969	1	3	302
971	1	12	170
974	1	319	161
976	1	692	348
977	1	2	211
982	1	1926	982
984	1	589	296

TABLE 3

S. aureus - Putative coding regions of novel proteins not similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)
987	1	3	467
993	1	1	525
994	1	920	549
1004	1	557	318
1014	1	624	313
1015	1	2	463
1016	1	288	145
1019	1	1205	660
1022	1	839	674
1024	1	595	299
1024	2	276	431
1030	1	673	338
1032	1	355	179
1040	1	794	399
1043	1	3	269
1044	2	115	399
1047	1	1	159
1051	1	704	354
1051	2	1233	713
1063	1	2	400
1069	1	2	148
1069	2	765	533
1075	1	707	399
1077	1	97	405
1081	1	58	438
1086	1	1	384
1087	2	246	431

TABLE 3

S. aureus - Putative coding regions of novel proteins not similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)
1088	1	3	174
1096	1	474	238
1098	1	1015	509
1100	1	1020	511
1100	2	1520	1158
1101	1	703	353
1102	1	385	194
1107	1	2	580
1114	1	3	422
1115	1	2	288
1119	1	22	267
1129	1	40	342
1132	1	360	181
1133	1	609	376
1146	1	446	225
1147	1	558	280
1153	1	1	153
1154	1	3	818
1159	1	1	330
1161	1	341	186
1164	1	427	254
1171	1	19	240
1171	2	108	299
1183	1	2	379
1195	1	355	179
1196	1	1	189
1200	1	33	197

TABLE 3

S. aureus - Putative coding regions of novel proteins not similar to known proteins

Config	ORF	Start	Stop
10	10	(nt)	(nt)
1203	2	125	464
1222	2	105	401
1232	1	1	387
1240	1	2	175
1247	1	520	311
1271	1	412	221
1286	1	2	555
1295	1	1	165
1306	1	367	185
1314	2	158	631
1316	1	58	570
1359	1	384	193
1370	1	1	402
1371	1	1	345
1374	1	710	357
1378	1	2	400
1392	1	3	413
1411	1	202	432
1433	1	331	167
1450	1	2	256
1453	1	295	149
1471	1	721	398
1477	1	869	639
1502	1	794	399
1518	1	126	449
1534	1	283	143
1546	1	3	401

TABLE 3

S. aureus - Putative coding regions of novel proteins not similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)
1547	1	506	255
1583	1	3	350
1587	1	3	563
1602	2	170	679
1629	1	1	402
1665	1	468	235
1760	1	625	314
1762	1	3	200
1876	2	119	286
1895	1	2	379
1931	1	798	400
1976	2	715	383
2055	2	252	401
2056	1	331	167
2150	1	523	263
2157	1	794	399
2164	1	564	283
2175	1	218	400
2212	1	492	331
2338	1	732	367
2342	1	3	167
2352	1	330	166
2352	2	622	398
2355	1	47	352
2356	1	679	341
2359	1	301	352
2421	1	296	150

TABLE 3

S. aureus - Putative coding regions of novel proteins not similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)
3046	1	367	185
3049	1	553	278
3050	1	3	314
3052	1	504	253
3065	1	2	157
3070	1	357	190
3075	1	440	222
3080	1	1	285
3092	1	320	162
3093	1	411	250
3100	1	52	237
3103	1	47	298
3118	1	344	174
3123	1	2	145
3127	1	1	147
3138	1	316	169
3142	1	388	203
3144	1	664	386
3151	1	337	170
3155	2	203	384
3168	1	12	176
3205	1	288	145
3282	1	1	150
3303	2	239	400
3371	2	211	399
3558	1	2	148
3558	2	36	401

TABLE 3

S. aureus - putative coding regions of novel proteins not similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)
3046	1	367	185
3049	1	553	278
3050	1	3	314
3052	1	504	253
3065	1	2	157
3070	1	357	190
3075	1	440	222
3080	1	1	285
3092	1	320	162
3093	1	411	250
3100	1	52	237
3103	1	47	298
3118	1	344	174
3123	1	2	145
3127	1	1	147
3138	1	336	169
3142	1	388	203
3144	1	664	386
3151	1	337	170
3155	2	202	384
3188	1	12	176
3205	1	288	145
3282	1	1	150
3303	2	239	400
3371	2	211	399
3558	1	2	148
3558	2	36	401

TABLE 3

S. aureus - Putative coding regions of novel proteins not similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)
3568	1	751	377
3595	1	757	380
3618	1	2	238
3618	2	130	402
3622	1	86	358
3622	2	664	398
3642	1	876	439
3645	1	781	398
3651	1	625	314
3664	1	467	637
3674	1	55	402
3677	1	619	311
3704	1	1	402
3726	1	535	269
3765	1	510	256
3779	1	554	357
3794	1	266	135
3794	2	667	377
3796	2	638	375
3801	1	474	262
3806	1	453	298
3807	1	42	389
3815	1	798	400
3827	1	3	320
3842	1	781	392
3853	1	671	399
3855	1	1	324

TABLE 3

S. aureus - Putative coding regions of novel proteins not similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)
3857	1	2	235
3861	1	590	297
3865	1	695	399
3897	1	3	173
3897	2	143	400
3898	2	225	401
3921	2	103	342
3927	1	70	375
3930	1	76	234
3946	2	651	382
3951	2	105	377
3965	1	646	344
3972	1	795	400
3981	1	3	311
3998	1	3	356
4001	1	481	296
4003	1	90	335
4018	1	2	259
4018	2	186	401
4021	1	1	345
4043	1	3	344
4054	1	3	344
4066	1	1	150
4070	1	1	324
4072	2	187	390
4073	1	1	285
4077	2	127	372

TABLE 3

S. aureus - Putative coding regions of novel proteins not similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)
4083	1	3	359
4090	1	27	368
4101	1	103	297
4105	1	1	306
4107	1	570	286
4119	1	629	339
4121	1	740	372
4123	1	3	230
4127	1	3	341
4128	1	2	331
4130	1	768	415
4146	1	97	381
4157	1	3	206
4186	1	505	254
4224	1	510	256
4239	1	1	348
4242	1	709	356
4252	1	589	296
4253	1	1	174
4256	1	568	323
4258	2	498	334
4267	1	284	144
4271	1	2	304
4287	1	303	163
4289	1	471	319
4302	1	153	305
4304	1	1	186

TABLE 3

S. aureus - Putative coding regions of novel proteins not similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)
4304	2	96	314
4306	1	2	151
4318	1	576	289
4322	1	5	148
4331	1	439	221
4331	2	528	364
4338	1	728	399
4346	1	471	277
4357	2	117	311
4373	1	2	268
4381	1	574	326
4384	1	614	309
4397	1	9	311
4402	1	1	249
4403	1	606	328
4406	1	3	317
4411	1	2	280
4411	2	697	398
4412	1	2	364
4418	1	3	230
4424	1	601	398
4443	1	427	215
4471	1	643	323
4478	1	540	271
4482	1	30	289
4489	1	601	302
4491	1	12	206

TABLE 3

S. aureus - Putative coding regions of novel proteins not similar to known proteins

Contig ID	ORF ID	Start (nt)	Stop (nt)
4495	1	3	179
4496	1	500	252
4500	1	130	306
4511	1	493	248
4518	1	1	246
4526	1	480	241
4527	1	2	163
4532	1	3	239
4542	1	11	175
4567	1	36	200
4573	1	1	231
4578	1	642	322
4619	1	1	180
4620	1	349	176
4662	1	1	246
4669	1	2	157
4680	1	28	183
4690	1	344	174

Table 4

ORF	SEQ ID NO	BLAST HOMOLOG	Antigenic Regions			
			Region 1	Region 2	Region 3	Region 4
168_6	5192	lipoprotein	36-45	84-103	152-161	176-185
238_1	5193	chrA	21-39	48-58	84-95	232-249
51_2	5194	OppB gene product (B. sub)	20-36	70-79	100-112	121-131
278_3	5195	lipoprotein 1	20-29	59-73	85-97	162-171
276_2	5196	lipoprotein	21-33	65-74	177-186	211-220
45_4	5197	ProX	28-37	59-69	85-100	120-129
316_8	5198	hypothetical protein	45-54	88-97	182-192	243-253
154_15	5199	unknown	31-40	48-58	79-88	95-104
228_3	5200	unknown	25-38	40-52	64-74	80-89
228_6	5201	unknown	29-41	89-101	128-143	173-184
50_1	5202	unknown	21-33	52-61	168-182	197-206
112_7	5203	iron-binding periplasmic	21-31	58-67	92-101	111-120
442_1	5204	unknown	30-39	91-100	122-137	182-192
66_2	5205	unknown	50-59	104-116	127-136	167-182
304_2	5206	Q-binding periplasmic	19-28	48-57	75-84	103-116
44_1	5207	hypothetical protein	27-36	86-95	129-138	192-201
161_4	5208	SphX	27-44	149-161	166-175	201-210
46_5	5209	cmpC (permease)	21-33	61-70	83-92	100-109
942_1	5210	traH [Plasmid pSK41]	83-92	109-118	127-142	
5_4	5211	ORF (S. aureus)	12-22	87-96	111-120	151-160
20_4	5212	peptidoglycan hydrolase (S.	24-34	129-138	141-150	161-171
328_2	5213	lipoprotein (H. flu)	81-90	123-133	290-299	
520_2	5214	fibronectin binding protein	44-54	63-79	81-90	95-110
771_1	5215	emm1 gene product (S. pyo)	30-39	65-82	96-106	112-121
999_1	5216	predicted tnthorax prot. (D	7-16	120-129	157-166	
853_1	5217	ORF2136 (Marchantia polyr	43-52	88-97	102-111	
287_1	5218	psaA homolog	13-22	28-44	72-82	114-124
288_2	5219	cell wall enzyme	14-23	89-98		
596_2	5220	penicillin binding protein 2b	40-49	59-68	76-87	106-115
217_5	5221	fibronectin/fibrinogen bindi	28-37	40-49	62-71	93-111
217_6	5222	fibronectin/fibrinogen bp	10-19	31-40	54-62	73-92
528_3	5223	myosin cross reactive prote	4-13	29-47	60-73	90-99
171_11	5224	EF	20-31	91-110		
63_4	5225	penicillin binding protein 2b	12-21	59-68	95-104	
353_2	5226		46-55	62-71		
743_1	5227	29 kDa protein in fimA regi	23-32	68-79	94-103	175-184
342_4	5228	Twitching motility	10-19	48-60	83-92	111-121
69_3	5229	arabinogalactan protein	97-106	132-141	158-167	180-189
70_6	5230	nodulin	36-45	48-57	137-160	179-188
129_2	5231	glycerol diester phosphodie	8-17	41-50	55-74	97-106
58_5	5232	PBP (S. aureus)	26-35	70-79	117-126	152-161
188_3	5233	MHC class II analog (S. aure	72-81	94-103	115-124	136-145
236_6	5234	histidine kinase domain (Dic	24-33	52-67	81-94	106-121
310_8	5235	clumping factor (S. aureus)	59-71	77-86	93-102	118-127
601_1	5236	novel antigen/ORF2 (S. au	45-54	91-104	108-117	186-195
544_3	5237	ORF YJR151c (S. cerevisae	76-90	101-111	131-140	154-164
662_1	5238	MHC class II analog (S. aure	22-32	71-80	89-98	114-122
87_7	5239	5' nucleotidase precursor ('	29-45	62-71	105-114	125-137
120_1	5240	B65G gene product (B. sub	102-111			

Table 4

ORF	Antigenic		Regions		(cont)	
	Region 5	Region 6	Region 7	Region 8	Region 9	Region 10
168_6	244-272	303-315				
238_1	260-269	291-301	308-317			
51_2	140-152	188-208	211-220	256-266	273-283	
278_3	198-209					
276_2	255-268					
45_4	177-199	221-230	234-243	268-279	284-293	304-313
316_8						
154_15	148-157	177-187	202-211			
228_3	101-119	139-154	166-181			
228_6						
50_1						
112_7	136-149	197-211	218-229	253-273		
442_1	199-210	247-257	264-277	287-309		
66_2						
304_2	178-187	250-259				
44_1						
161_4						
46_5	131-141	162-176	206-215	243-252	264-273	285-294
942_1						
5_4	189-205	230-239	246-264	301-318	340-354	378-387
20_4	202-212	217-234	260-275	314-336	366-373	380-391
328_2						
520_2						
771_1	145-154					
999_1						
853_1						
287_1	154-164					
288_2						
596_2	121-130					
217_5	244-253	259-268	288-297	302-311		
217_6	144-158	174-183	188-197	207-216	226-242	
528_3						
171_11						
63_4						
353_2						
743_1	197-207					
342_4						
69_3	195-211					
70_6	206-215	263-272	291-301	331-340	358-371	390-414
129_2	117-127	141-157	168-183	202-211	222-231	261-270
58_5	184-203	260-269	275-299	330-344	372-381	424-433
188_3						
236_6	138-147	163-172	187-198	244-261	268-278	308-317
310_8	131-140	144-153	177-186	190-199	204-213	216-227
601_1	208-218					
544_3	170-179	184-193	224-235	274-287	327-336	352-361
662_1						
87_7						
120_1						

Table 4

	ORF	Antigenic		Regions		(cont)	
		Region 11	Region 12	Region 13	Region 14	Region 15	Region 16
5	168_6						
	238_1						
	51_2						
10	278_3						
	276_2						
	45_4						
	316_8						
	154_15						
15	228_3						
	228_6						
	50_1						
	112_7						
	442_1						
20	66_2						
	304_2						
	44_1						
	161_4						
	46_5	306-315					
25	942_1						
	5_4	393-407	416-426	456-465			
	20_4	396-405	410-419	461-481			
	328_2						
	520_2						
30	771_1						
	999_1						
	853_1						
	287_1						
	288_2						
35	596_2						
	217_5						
	217_6						
	528_3						
	171_11						
40	63_4						
	353_2						
	743_1						
	342_4						
	69_3						
45	70_6	453-471	506-515				
	129_2	296-315					
	58_5						
	188_3						
50	236_6	358-377	410-423	428-439	442-457	467-476	480-493
	310_8	238-251	256-275	281-290	296-310	314-333	338-347
	601_1						
	544_3						
	662_1						
55	87_7						
	120_1						

Table 4

ORF	Antigenic Regions (cont)					
	Region 17	Region 18	Region 19	Region 20	Region 21	Region 22
168_6						
238_1						
51_2						
278_3						
276_2						
45_4						
316_8						
154_15						
228_3						
228_6						
50_1						
112_7						
442_1						
66_2						
304_2						
44_1						
161_4						
46_5						
942_1						
5_4						
20_4						
328_2						
520_2						
771_1						
999_1						
853_1						
287_1						
288_2						
596_2						
217_5						
217_6						
528_3						
171_11						
63_4						
353_2						
743_1						
342_4						
69_3						
70_6						
129_2						
58_5						
188_3						
236_6						
310_8	357-366	370-379	429-438	443-452	478-487	551-560
601_1						
544_3						
662_1						
87_7						
120_1						

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Table 4

ORF	Antigenic Regions (cont)					
	Region 23	Region 24	Region 25	Region 26	Region 27	Region 28
168_6						
238_1						
51_2						
278_3						
276_2						
45_4						
316_8						
154_15						
228_3						
228_6						
50_1						
112_7						
442_1						
66_2						
304_2						
44_1						
161_4						
46_5						
942_1						
5_1						
20_4						
328_2						
520_2						
771_1						
999_1						
853_1						
287_1						
288_2						
596_2						
217_5						
217_6						
528_3						
171_11						
63_4						
353_2						
743_1						
342_4						
69_3						
70_6						
129_2						
58_5						
188_3						
236_6						
310_8	622-632	670-685	708-718	823-836	858-867	877-886
601_1						
544_3						
662_1						
87_7						
120_1						

Table 4

	ORF	Antigenic Regions		(cont)
		Region 29	Region 30	
5	168_6			
	238_1			
	51_2			
	278_3			
10	276_2			
	45_4			
	316_8			
	154_15			
	228_3			
15	228_6			
	50_1			
	112_7			
	442_1			
	66_2			
20	304_2			
	44_1			
	161_4			
	46_5			
25	942_1			
	5_4			
	20_4			
	328_2			
	520_2			
30	771_1			
	999_1			
	853_1			
	287_1			
	288_2			
35	596_2			
	217_5			
	217_6			
	528_3			
	171_11			
40	63_4			
	353_2			
	743_1			
	342_4			
	69_3			
45	70_6			
	129_2			
	58_5			
	188_3			
	236_6			
50	310_8			
	601_1			
	544_3			
	662_1			
55	87_7			
	120_1			

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Table 4

ORF	BLAST HOMOLOG	Antigenic Region 1	Regions			
			Region 2	Region 3	Region 4	
46_1	5241	aldehyde dehydrogenase	8-17	36-52	83-96	112-121
63_4	5242	glycerol ester hydrolase (P.	9-26	57-73	93-107	123-133
174_6	5243	ketopantoate hydroxymeth	71-80	203-212	242-254	265-274
206_16	5244	ornithine acetyltransferase	1-10	34-43	54-63	194-210
267_1	5245	NaH-antiporter protein (E. I	120-129	332-347	398-408	
322_1	5246	acriflavin resistance protein	58-75	153-164	203-231	264-284
415_2	5247	transport ATP-binding prot	108-126	218-227	298-308	315-334
214_3	5248	2-nitropropane dioxygenase	123-136	216-233	283-292	297-306
587_3	5249	clumping factor	5-14	43-54	59-68	76-95
685_1	5250	signal peptidase	59-68	72-81	86-95	99-108
54_3	5251	fibronectin binding protein I	23-32	37-46	50-59	89-98
54_4	5252	fibronectin binding protein I	43-52	66-75	95-104	147-156
54_5	5253	fibronectin binding protein I	49-60	81-90		
54_6	5254	fibronectin binding protein I	55-71	82-97	139-158	175-186
328_1	5255	lipoprotein (H. flu)	11-20	61-70	96-105	

Table 4

ORF	Antigenic Regions (cont)					
	Region 5	Region 6	Region 7	Region 8	Region 9	Region 10
46_1	215-242	333-352	376-385	416-432	471-487	
63_4	145-154	191-202	212-223	245-265	274-283	291-300
174_6						
206_16	239-259	275-284				
267_1						
322_1	298-319	350-359				
415_2	344-353	371-380	395-404	456-465	486-495	518-527
214_3	318-337	365-375				
587_3	106-115	142-151	156-166	173-182	186-198	204-213
685_1	113-122	130-145				
54_3	128-138	185-194	217-226	251-260	268-277	295-305
54_4	175-188	191-200	203-212	220-229		
54_5						
54_6	220-230	287-304	317-326	344-353	364-373	378-387
328_1						

Table 4

ORF	Antigenic Regions			(cont)		
	Region 11	Region 12	Region 13	Region 14	Region 15	Region 17
46_1						
63_4	306-315	319-328	366-376	395-420	453-462	467-476
174_6						
206_16						
267_1						
322_1						
415_2	539-555					
214_3						
587_3	217-226	278-287	318-327	332-342	351-360	377-386
685_1						
54_3	316-325	329-345	355-372	387-396	416-425	438-448
54_4						
54_5						
54_6	396-407	427-436	514-531	541-550	569-578	612-622
328_1						

Table 4

ORF	Antigenic Regions			(cont)		
	Region 18	Region 19	Region 20	Region 21	Region 22	Region 23
46_1						
63_4	485-500	513-525				
174_6						
206_16						
267_1						
322_1						
415_2						
214_3						
587_3	396-405	426-442	459-470	485-494	505-514	531-562
685_1						
54_3	455-462	472-491	517-536			
54_4						
54_5						
54_6	639-648	673-681	703-715	723-732	749-760	772-788
328_1						

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Table 4

ORF	Antigenic Regions (cont)					
	Region 24	Region 25	Region 26	Region 27	Region 28	Region 29
46_1						
63_4						
174_6						
206_16						
267_1						
322_1						
415_2						
214_3						
587_3	567-578	584-601	607-840	844-854	858-870	877-886
685_1						
54_3						
54_4						
54_5						
54_6	793-802	811-826	834-848	866-876	893-903	907-918
328_1						

Table 4

ORF	Antigenic Regions (cont)	
	Region 30	Region 31
46_1		
63_4		
174_6		
206_16		
267_1		
322_1		
415_2		
214_3		
587_3	889-911	927-936
685_1		
54_3		
54_4		
54_5		
54_6	925-944	951-997
328_1		

SEQUENCE LISTING

5 (1) GENERAL INFORMATION:

(i) APPLICANT:

- 10 (A) NAME: Human Genome Sciences, Inc.
(B) STREET: 9410 Key West Avenue
(C) CITY: Rockville
(D) STATE: Maryland
(E) COUNTRY: US
15 (F) POSTAL CODE: 20850

(ii) TITLE OF INVENTION: Staphylococcus aureus Poly-
nucleotides and Sequences

20 (iii) NUMBER OF SEQUENCES: 5255

(v) COMPUTER READABLE FORM:

- 25 (A) MEDIUM TYPE: Diskette, 3.50 inch, 1.4 Mb storage
(B) COMPUTER: HP Vectra 486/33
(C) OPERATING SYSTEM: MSDOS version 6.2
(D) SOFTWARE: ASCII Text

30 (vi) CURRENT APPLICATION DATA:

- (A) APPLICATION NUMBER:
(B) FILING DATE:

35 (vii) PRIOR APPLICATION DATA:

- (A) APPLICATION NUMBER: US 60/009,861
(B) FILING DATE: 05-JAN-1996

40 (2) INFORMATION FOR SEQ ID NO:1:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 5895 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: double

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 1:

10 TCCATTATGA AGTCACAAGT ACTATAAGCT GCGATGTTAC CAATGTTTTT TAAAATCCCA 60
 GTAATAAAAT CAAAAAATAA GTTAAATAAT GTATTCATTT TAAGTCCTCC TTAATAAAGa 120
 15 aaataGGTAA TAATGTAATA GCTTCTATTA TGATGCCTAA TTGAATGAAT TGGGCAAATG 180
 GCTCTTTGAT GATAAGTGTG ATAATGAAAA GGGTTAAACT AACATAATC GCATAATATT 240
 TTTTTCGTTT AATAAGTCGC ACAGGAATGG GCTTCTTTTT AGTTGCTGCA GGAGCATATA 300
 20 CTGAGATTAC ACCTAAAGAA ATAACTGTTA AAATAATCAT AATTAAAAAG TTAATATGAA 360
 AATTTACTAT TACTAAAGGT AAAAGTATAA ATAGTATAAT ACTTCTTACA TAACACCAAA 420
 AAGAAGAAGG TGCATGTGCa CCATGTGCAT GtCTTCTTAT TAAATAAAAT GTTAAATTCTG 480
 25 TAATTAACGT AACAGAAAA ATGTTTAAAA TATAGGCAAT AGTATACATA ACAATTAATT 540
 TACCTATATT TTTAGCTAAG ACCTGCATCC CTAATCGTAC TTGCAAAAAT TGAATATGAT 600
 30 CTAAGTTATT TCTCTTTTGA AGATACGTGG CAAACTGGTC AATTTTATTA TCAAAATAAT 660
 TCAATTTTAC ACCACTCTCC TCACTGTCAT TATACGATTT AGTACAATCT TTTATCATTa 720
 TATTGCCTAA CTGTAGGAAA TAAATACTTA ACTGTTAAAT GTAATTTGTA TTTAATATTT 780
 35 TAACATAAAA AAATTTACAG TTAAGAATAA AAAACGACTA GTTAAGAAAA ATTGGAAAAAT 840
 AAATGCTTTT AGCATGTTTT AATATAACTA GATCACAGAG ATGTGATGGA AAATAGTTGA 900
 TGAGFTGTTT AATTTTAAGA ATTTTATCT TAATTAAGGA AGGAGTGATT TCAATGGCAC 960
 40 AAGATATCAT TTCAACAATC GGTGACTTAG TAAATGGAT TATCGACACA GTGAACAAAT 1020
 TCACTAAAAA ATAAGATGAA TAATTAATTA CTTTCATTGT AAATTTGTTA TCTTCGTATA 1080
 45 GTACTAAAAG TATGAGTTAT TAAGCCATCC CAACTTAATA ACCATGTAAA ATTAGCAAGT 1140
 GAGTAACATT TGCTAGTAGA GTTAGTTTCC TTGGACTCAG TGCTATGTAT TTTTCTTAAT 1200
 TATCATTACA GATAATTATT TCTAGCATGT AAGCTATCGT AAACAACATC GATTTATCAT 1260
 50 TATTTGATAA ATAAAATTTT TTCATAATT AATAACATCC CCAAAAATAG ATTGAAAAAA 1320
 TAACTGTAAA ACATTCCTTT AATAATAAGT ATGGTCGTGA GCCCCTCCCA AGCTCGCGGC 1380
 CTTTTTTGTA ATGAAGAAGG GATGAGTTAA TCATCATTAT GAGACCCGCC GTTAAATAT 1440

His Lys Ala
1025

5 (2) INFORMATION FOR SEQ ID NO:5255:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 155 amino acids
(B) TYPE: amino acid
10 (C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

15 (xi) SEQUENCE DESCRIPTION: SEQ ID NO:5255:

20 Gly Glu Lys Cys Met Phe Leu Ala Trp Asn Glu Ile Arg Arg Asn Lys
1 5 10 15
Leu Lys Phe Gly Leu Ile Ile Gly Val Leu Thr Met Ile Ser Tyr Leu
20 25 30
25 Leu Phe Leu Leu Ser Gly Leu Ala Asn Gly Leu Ile Asn Met Asn Lys
35 40 45
Glu Gly Ile Asp Lys Trp Gln Ala Asp Ala Ile Val Leu Asn Lys Asp
30 50 55 60
Ala Asn Gln Thr Val Gln Gln Ser Val Phe Asn Lys Lys Asp Ile Glu
65 70 75 80
35 Asn Lys Tyr Lys Lys Gln Ala Thr Leu Lys Gln Thr Gly Glu Ile Val
85 90 95
Ser Asn Gly His Gln Lys Asp Asn Val Leu Val Phe Gly Val Glu Lys
100 105 110
40 Ser Ser Phe Leu Val Pro Ser Leu Ile Glu Gly His Lys Ala Thr Lys
115 120 125
Asp Asn Glu Val Leu Ala Asp Glu Thr Leu Lys Asn Lys Gly Leu Lys
45 130 135 140
Leu Gly Asp Thr Leu Ser Leu Ser Xaa Xaa Arg
145 150 155

50 Claims

1. Computer readable medium having recorded thereon a nucleotide sequence of the Staphylococcus aureus genome as depicted in SEQ ID NOS:1-5,191, a representative fragment thereof or a nucleotide sequence at least
55 95 % identical to a nucleotide sequence depicted in SEQ ID NOS:1-5,191.
2. Computer readable medium having recorded thereon any one of the fragments of SEQ ID NOS:1-5,191 depicted in Tables 2 and 3 or a degenerate variant thereof.

3. The computer readable medium of claim 1, wherein said medium is selected from the group consisting of a floppy disc, a hard disc, random access memory (RAM), read only memory (ROM), and CD-ROM.
- 5 4. The computer readable medium of claim 3, wherein said medium is selected from the group consisting of a floppy disc, a hard disc, random access memory (RAM), read only memory (ROM), and CD-ROM.
5. A computer-based system for identifying fragments of the *Staphylococcus aureus* genome of commercial importance comprising the following elements:
 - 10 (a) a data storage means comprising the nucleotide sequence of SEQ ID NOS:1-5,191, a representative fragment thereof, or a nucleotide sequence at least 95% identical to a nucleotide sequence of SEQ ID NOS:1-5,191;
 - (b) search means for comparing a target sequence to the nucleotide sequence of the data storage means of step (a) to identify homologous sequence(s), and
 - 15 (c) retrieval means for obtaining said homologous sequence(s) of step (b).
6. A method for identifying commercially important nucleic acid fragments of the *Staphylococcus aureus* genome comprising the step of comparing a database comprising the nucleotide sequences depicted in SEQ ID NOS:1-5,191, a representative fragment thereof, or a nucleotide sequence at least 95% identical to a nucleotide sequence of SEQ ID NOS:1-5,191 with a target sequence to obtain a nucleic acid molecule comprised of a complementary nucleotide sequence to said target sequence, wherein said target sequence is not randomly selected.
- 20 7. A method for identifying an expression modulating fragment of *Staphylococcus aureus* genome comprising the step of comparing a database comprising the nucleotide sequences depicted in SEQ ID NOS:1-5,191, a representative fragment thereof, or a nucleotide sequence at least 95% identical to the nucleotide sequence of SEQ ID NOS:1-5,191 with a target sequence to obtain a nucleic acid molecule comprised of a complementary nucleotide sequence to said target sequence, wherein said target sequence comprises sequences known to regulate gene expression.
- 25 8. A protein-encoding nucleic acid fragment of the *Staphylococcus aureus* genome, wherein said fragment comprises the nucleotide sequence of any one of the fragments of SEQ ID NOS:1-5,191 depicted in Tables 2 and 3 or a nucleotide sequence at least 95% identical to such a nucleotide sequence, or a degenerate variant of any of the aforementioned sequences.
- 30 9. The nucleic acid fragment of claim 8 which is DNA.
10. The nucleic acid fragment of claim 8 which is RNA.
11. A vector comprising a fragment of claim 8.
- 40 12. A fragment of the *Staphylococcus aureus* genome, wherein said fragment modulates the expression of an operably linked open reading frame, wherein said fragment consists of the nucleotide sequence from about 10 to 200 bases in length which is 5' to any one of the open reading frames depicted in Tables 2 and 3 or a nucleotide sequence at least 95% identical to such a nucleotide sequence or a degenerate variant of any of the aforementioned sequences.
- 45 13. A vector comprising a fragment of claim 12.
14. An organism which has been altered to contain any one of the fragments of the *Staphylococcus aureus* genome of claim 8.
- 50 15. A method for producing a polypeptide in a host cell comprising the steps of:
 - 55 (a) incubating an organism of claim 14 under conditions where said fragment is expressed to produce said protein, and
 - (b) isolating said protein.
16. An organism which has been altered to contain any one of the fragments of the *Staphylococcus aureus* genome

of claim 12.

17. A method for regulating the expression of a nucleic acid molecule comprising the step of covalently attaching to said nucleic acid molecule a nucleic acid molecule consisting of the nucleotide sequence from about 30 to 300 bases 5' to any one of the fragments of the *Staphylococcus aureus* genome depicted in Seq ID Nos:1-5,191 and Tables 2 and 3 or a nucleotide sequence at least 95% identical to such a nucleotide sequence or a degenerate variant of any of the aforementioned sequences.
18. A nucleic acid molecule being a homolog of any of the fragments of the *Staphylococcus aureus* genome of SEQ ID NOS:1-5,191 and Tables 2 and 3, wherein said nucleic acid molecule is produced by a process comprising the steps of:
 - (a) screening a genomic DNA library using as a probe a target sequence defined by any of SEQ ID NOS:1-5,191 and Tables 2 and 3, including fragments thereof;
 - (b) identifying members of said library which contain sequences that hybridize to said target sequence;
 - (c) isolating the nucleic acid molecules from said members identified in step (b).
19. A DNA molecule being a homolog of any one of the fragments of the *Staphylococcus aureus* genome of SEQ ID NOS:1-5,191 and Tables 2 and 3; wherein said nucleic acid molecule is produced by a process comprising the steps of:
 - (a) isolating mRNA, DNA, or cDNA produced from an organism;
 - (b) amplifying nucleic acid molecules whose nucleotide sequence is homologous to amplification primers derived from said fragment of said *Staphylococcus aureus* genome to prime said amplification;
 - (c) isolating said amplified sequences produced in step (b).
20. A polypeptide encoded by a fragment of claim 8.
21. An antibody which selectively binds to any one of the polypeptides of claim 20.
22. A kit for analyzing samples for the presence of polynucleotides derived from *Staphylococcus aureus*, comprising at least one polynucleotide containing a nucleotide sequence of any one of the fragments SEQ ID NOS:1-5,191 depicted in Tables 2 and 3 or a nucleotide sequence at least 95% identical thereto or a degenerate variant of any of the aforementioned sequences, that will hybridize to a *staphylococcus aureus* polynucleotide under stringent hybridization conditions, and a suitable container.
23. A *Staphylococcus aureus* polypeptide comprising an amino acid sequence identical to an amino acid sequence selected from the group consisting of SEQ ID NOS:5,192 to 5,255 or comprising an amino acid sequence having at least 95% identity to such a sequence.
24. A *Staphylococcus aureus* polypeptide antigen comprising at least one epitope derived from a *Staphylococcus aureus* polypeptide selected from the group consisting of SEQ ID NOS:5,192 to 5,255.
25. A polypeptide comprising at least one epitope encoded by a *Staphylococcus aureus* amino acid sequence selected from the group consisting of the epitopic sequences listed in Table 4.
26. The polypeptide of claim 24 or 26, wherein said polypeptide is fixed to a solid phase.
27. A diagnostic kit for detecting *Staphylococcus aureus* infection comprising
 - (a) an isolated polypeptide antigen of claim 24, and
 - (b) means for detecting the binding of an antibody contained in a biological fluid to said antigen.
28. A vaccine composition comprising a polypeptide of claim 24 present in a pharmaceutically acceptable carrier.
29. A method of vaccinating an individual against *Staphylococcus aureus* infection comprising, administering to an individual the vaccine composition of claim 28.

Figure 1

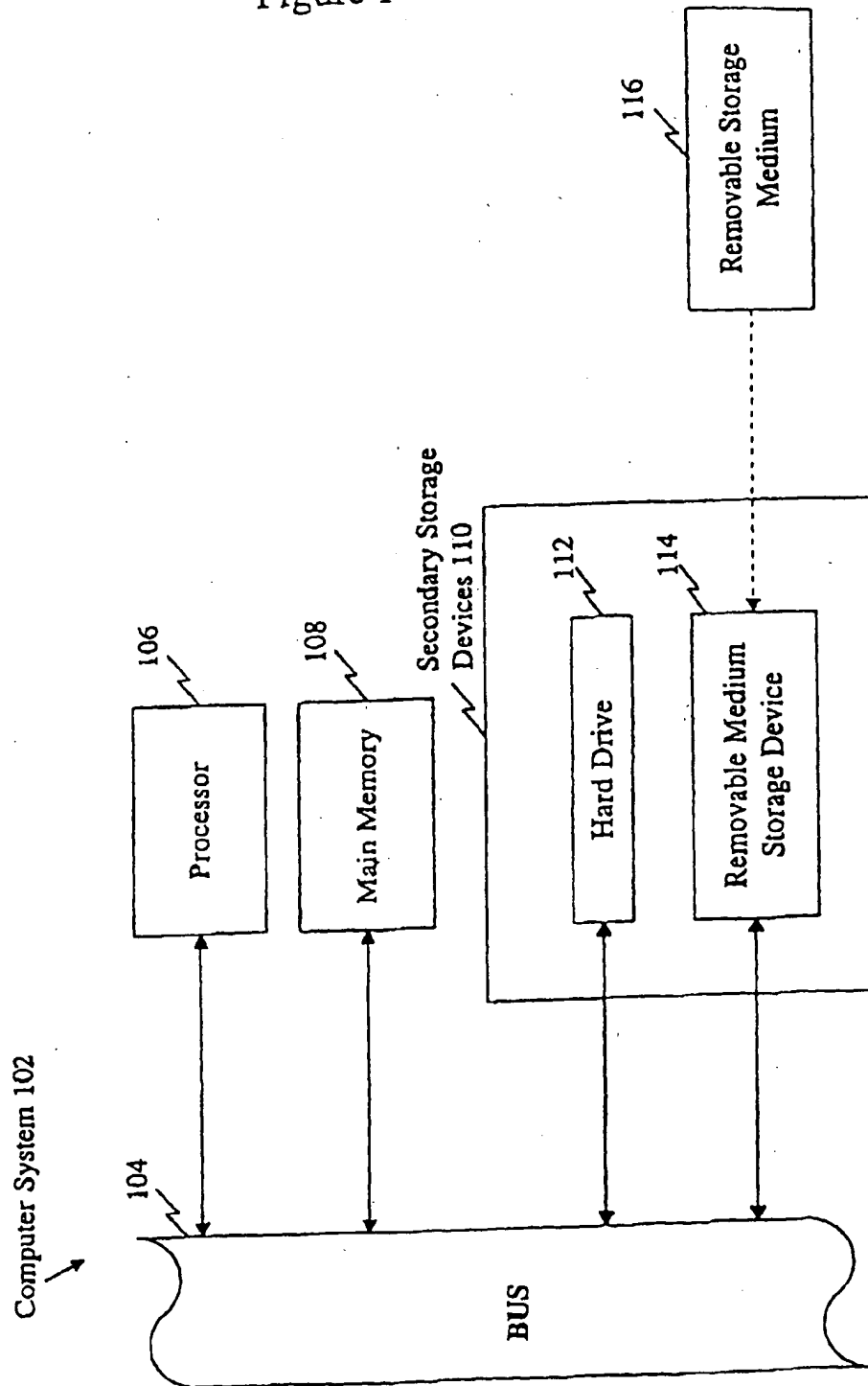


Figure 2

